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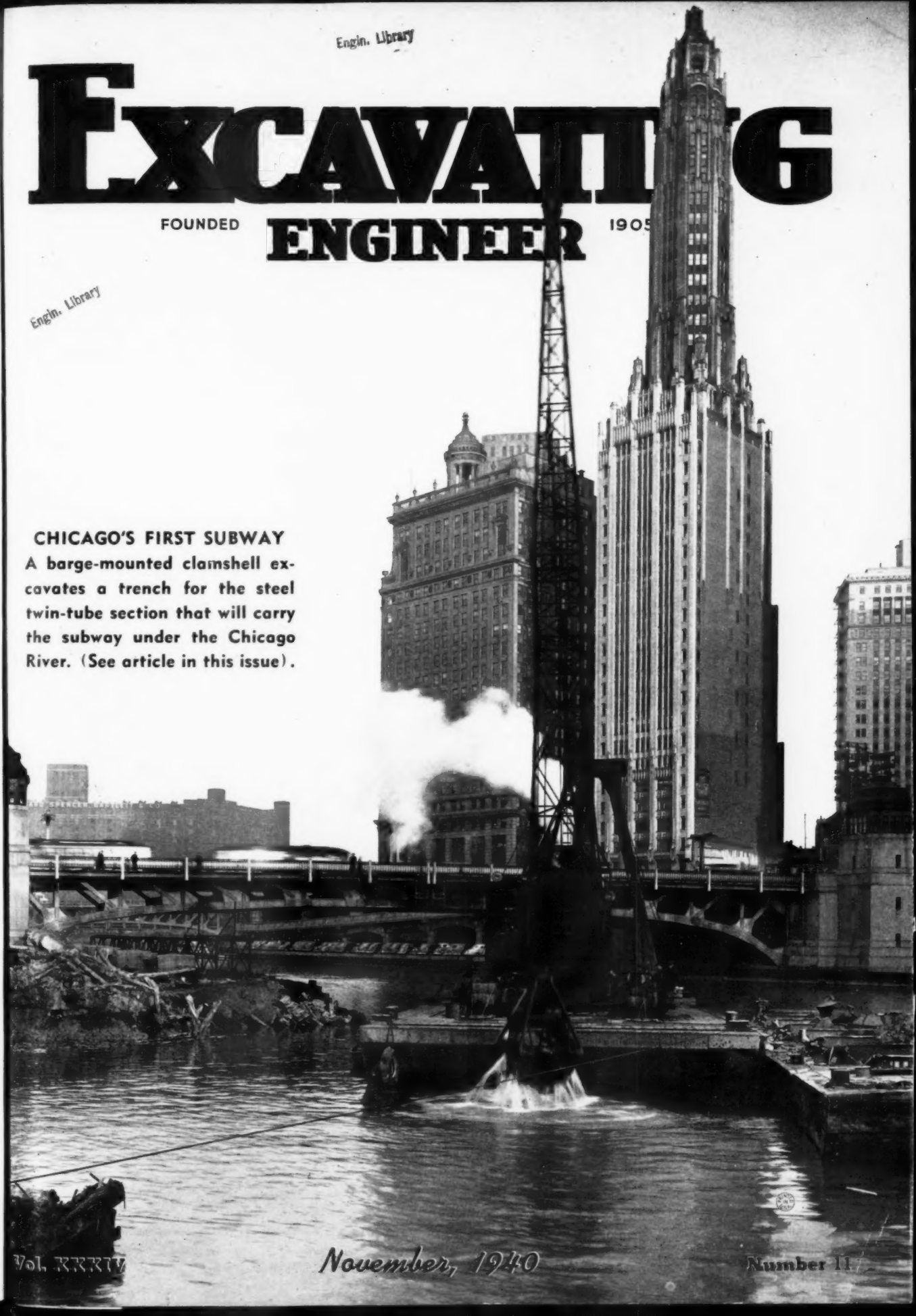

CHICAGO'S FIRST SUBWAY

A barge-mounted clamshell excavates a trench for the steel twin-tube section that will carry the subway under the Chicago River. (See article in this issue).

Vol. XXXIV November, 1940 Number 11

Modern Bucyrus-Erie Drills are Cutting Rock and Ore Production Costs for Owners Everywhere

Check what they can do for you!

Almost invariably, when our engineers are called in to survey the savings possible with a modern Bucyrus-Erie blast hole drill set-up, the preparation cost reductions are so obvious and startling that the customer asks, "Why wasn't I told these things before?"

It is easy to forget your blast hole drills and their costs . . . they are usually up on the bank more or less out of sight and out of mind.

But a dollar saved on drilling is just as good a dollar as any other you can make, and if you'll look over your annual cost records, you'll find quite a sizable piece of change tied up in drill operation.

Most installations we make, and we've been making a lot of them, show savings, after making normal depreciation allowance on the new equipment, of 30 to 50% of previous total drilling costs. If you are as much of a Scotchman as I am, that's important money and well worth saving.

An investigation of these modern drills involves no obligation on your part except for a bit of your time — let us show you what can be done to cut your drilling costs! Send for a bulletin today.

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

EXCAVATING ENGINEER

FOUNDED 1905

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Announcing THI

Another ROCK SHOVEL

WESTWARD BOUND for J. F. SHEA Los Angeles, Calif.

Making his Eleventh

THINK it over from this angle—lugging engine power that holds on in the "drag-down" loads; quiet, trouble-free transmission of power through the Helical Gear Drive mounted on ball and roller bearings and running in oil; smooth swing with the Uniform Pressure Swing Clutches; greater safety and longer cable life because of the Cushion Clutch; more crowding force with the Dual Independent Crowd that utilizes force other shovels waste—and boom strength to cope with rock digging because of the Northwest Welded Boom (and no Northwest Welded Boom has ever failed).

Add to this the ease of operation that is possible because of the "feather-touch" control with its freedom from complications, piping, etc.

This is a combination that is hard to beat—a combination that has made 1 out of every 3 Northwests a repeat order from satisfied customers.

A combination that has made J. F. Shea choose Northwest again!

NORTHWEST

NORTHWEST ENGINEERING CO.
1750 Steger Building
28 East Jackson Blvd.
Chicago Illinois

If it's a real Rock Shovel you won't have to worry about output in dirt

EXCAVATING
ENGINEER
NOVEMBER • 1940

CHICAGO'S

The Windy City finally goes underground to meet its increasingly complex local transportation problem and constructs 7.7 miles of twin-tubes as a nucleus for its future subway system

CHICAGO, world famous hog butcher, tool maker and stacker of wheat has turned subway builder. Her rapid growth to America's second largest city has offered a constantly increasing local transportation problem to city engineers who have finally turned to a $46,000,000 subway system to relieve traffic congestion.

It is surprising that Chicago, lusty pioneer in so many fields, has not constructed a subway before this. Boston's present day 23-mile system was started in 1898, while New York started operating her system in 1904 and today leads cities throughout the world with 133 miles of subway facilities. During the past 50 years many underground railway plans were considered by Chicago's city fathers, but these plans all fell by the wayside and a 43-year-old elevated railway continued to bear the brunt of an increasing rapid transportation problem.

During recent years transit facilities in Chicago's famed "Loop" section became so congested that a distinct tendency to establish business and shopping sections outside the central commercial district soon became apparent. In the face of this absolute need for further tranportation means, Chicago's Mayor Edward J. Kelly led the way for the final authorization and financing of the present 7.7 mile subway system which will be completed next year.

Planned as a nucleus of a future comprehensive network, Chicago's

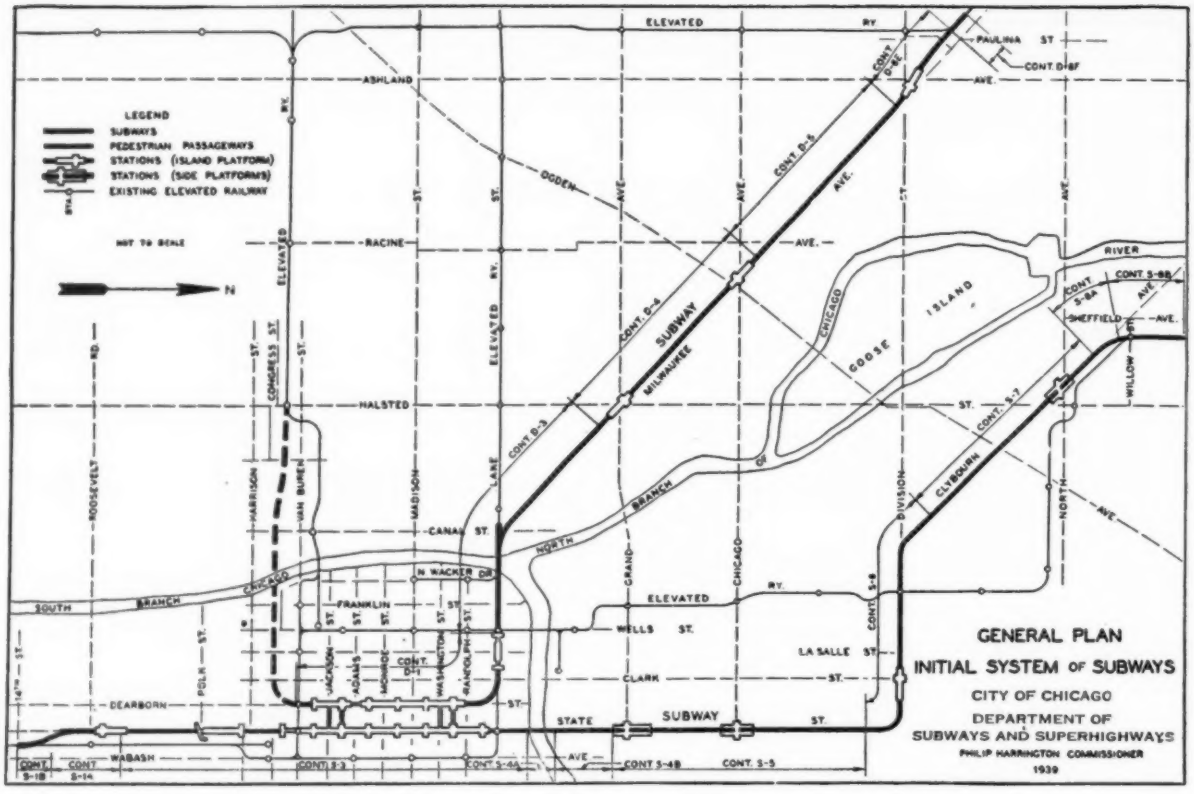
Above: A pumping station shaft on the Kenny Construction Company contract is excavated by a Bucyrus-Erie ⅝-yard clamshell. Below: Open cut work on a subway portal.

Below: Excavation of a 45-foot supply shaft to the John Marsch, Inc., subway contract is handled by a Link-Belt crane loading to a Mack truck.

Chicago Subway Contracts

Contracts	Double Tube Length (feet)	Bid Price	Contractor
TUNNEL CONTRACTS			
S-3	6,670	$ 8,212,835	Healy Subway Const. Corp.
S-4A*	329	468,099	Merritt Chapman, Scott Corp.
S-4B*	1,099	803,220	John C. Tully Co.
S-5*	3,635	2,571,331	Herlihy Mid-Continent Co.
S-6*	4,534	2,986,590	M. J. Boyle & Co.
S-7*	4,000	2,602,005	M. J. Boyle & Co.
D-1	4,275	6,436,855	Healy Subway Const. Corp.
D-3*	4,206	3,189,849	Paschen Contractors, Inc.
D-4*	3,448	2,019,354	John Marsch, Inc.
D-5*	3,577	1,958,918	Michael Pontarelli & Sons
Total Tunnel Contracts	35,773	$31,249,856	
STATION AND PORTAL CONTRACTS			
S-1A	1,380	$ 1,172,470	Paschen Contractors, Inc.
S-8A*	350	189,992	Robt. R. Anderson Co.
S-9A	Stations & Aux. Str.	624,466	Paschen Contractors, Inc.
S-9B	Stations & Aux. Str.	597,908	Kenny Constr. Co.
S-9C	Stations & Aux. Str.	485,786	Kenny Constr. Co.
S-10A	Stations & Aux. Str.	424,076	A. J. Forschner Co.
D-2B	Stations & Aux. Str.	389,574	John C. Tully Co.
D-6A	Aux. Str.	198,044	Joseph J. Duffy
D-6B	Stations & Aux. Str.	748,655	Minder Const. Co.
D-6E	1,530	927,926	M. J. Boyle & Co.
Total Station and Portal Contracts	3,260	$ 5,758,897	
Grand Totals	39,033	$37,008,753	
FUTURE CONTRACTS			
D-2C	Stations & Aux. Str.	S-10E	Stations & Aux. Str.
D-2D	Stations & Aux. Str.	D-6F	Subway Approach Section
S-10C	Stations & Aux. Str.	S-1B	Subway Approach Section
S-10D	Stations & Aux. Str.	S-8B	Subway Approach Section

* Completed



● General plan map of Chicago's 7.7 mile subway system, showing the division of contracts on the project.

first subway is being built primarily as the hub of the ultimate system which will eventually radiate from the "Loop" area to all parts of the city.

The $46,000,000 construction cost of the present system includes purchase of right-of-way, engineering, overhead and construction, but does not include operating equipment, station finish, mechanical and electrical equipment. Of this amount $28,000,000 will be paid from Chicago's special traction fund, thus avoiding any increase in taxes or the levying of special assessments. The balance of $18,000,000 has been provided through a PWA grant.

Over 2,000,000 yards of material is being excavated in the construction of 24 stations, three auxiliary stations, and 7.7 miles of twin-tubes. Structural materials for the system include 135,000 tons of steel, 1,000,000 barrels of cement, 500,000 cubic yards gravel, 400,000 cubic yards sand, and about 230 miles of conduit work.

Chief engineering problem that faced Chicago's Department of Subways and Superhighways was the difficulty in tunneling through a strata of soft blue clay that lies under the surface of the entire Chicago area. Many sidewalk superintendents freely predicted that the slippery, soggy clay subsoil would certainly shift and rupture the tunnel or bring many a

● Below: Open cut excavation for a subway station on the M. J. Boyle Company contract at Ashland and Milwaukee Avenues. Right: Boyle Company's Bucyrus-Erie 33-B crane places steel for the station structure.

"Loop" building tumbling down. Others pointed out that Chicago lacked the skilled "sand hogs" necessary for the task.

However, experience gained in building many miles of city sewers by compressed-air tunneling have enabled contractors and city engineers to tackle this larger twin-tube job with skill and confidence.

To complete the operations in the shortest possible time, construction was divided into 28 contracts. Ten of these contracts are for tunnel excavation and lining, while 18 call for station, portal and approach excavation and construction. A chart accompanying this article lists the contractors, prices, and amount of work. Cut-and-cover methods as used in the construction of New York's subways were considered, but tunneling methods were finally decided upon throughout to minimize interference with normal street traffic during the construction period.

Although all of the tube excavation was done by shield, powerknife, and hand mining methods, there was still plenty of work on the project for surface excavating equipment. All stations and portals called for open cut operations as well as access shafts to the subway proper for structural supplies and for the removal of excavated material.

Open-Cut Operations

A visit to several of the open-cut surface operations will give us some idea of the type of work being done so let's drop in on M. J. Boyle & Co.'s station contract D-6E, located at the intersection of Milwaukee and Ashland Aves.

Here we found the open-cut work well under way. A rectangular excavation 60x200 feet in size had already been dug and was being lined with structural steel piles and wooden lagging for the station and portal structure. Assisting in the placement of the steel was a Bucyrus-Erie 33-B crane that as a dragline had already completed a good part of the digging at this particular location.

Stairways from the subway surface station will lead to a point 17 feet below street level where a mezzanine will be built. From here stairways as well as escalators will take Chicago subway riders down another 20 feet to the loading platform.

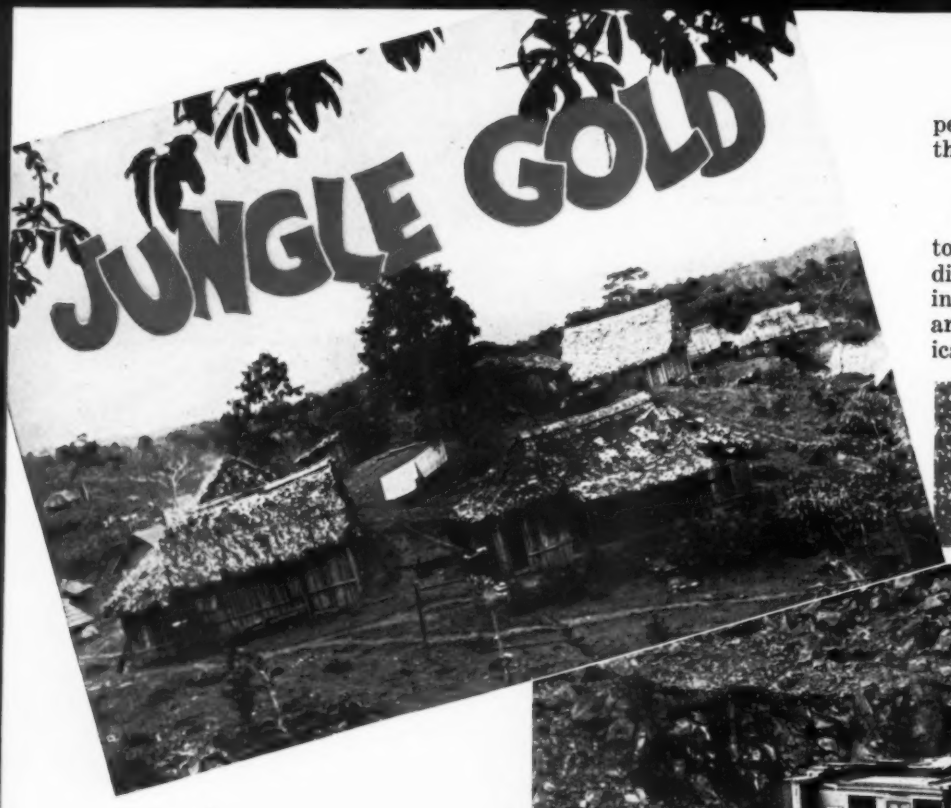
Excavation of air vent shafts and other auxiliary structures was another important job for surface excavating equipment. A visit to the Paschen Contractors, Inc. section on State Street revealed several of these shafts being excavated. Penetrating 40 feet below the surface these shafts, 7'9" in outside diameter, lead to a room about 30' long, 11' wide and 7' high which will house ventila-

(Continued on page 648)

● **Right: Northwest crane on the Paschen contract drives pile for a subway station. Below: Pumping station shaft on the Kenny contract is excavated by a Bucyrus-Erie ¾-yard clamshell.**

● **Left: Handyman on the Paschen Contractors, Inc. contract is this Caterpillar - mounted Trackson shovel. Right, below: Surface plant of John Marsch, Inc., one of the subway contractors on the Dearborn Street route.**

JUNGLE GOLD



La Luz Mines, Ltd., uses modern equipment and methods to overcome the problems surrounding recovery of gold ore from the jungles of Nicaragua.

By C. J. NELSON

Mine Superintendent, La Luz Mines, Ltd.

DEEP IN THE jungles of Nicaragua, Central America, modern power shovels are snorting and shoving their dippers into blasted, gold-bearing ore on the property of La Luz Mines, Ltd. This mine is located in latitude 14 north, about 90 miles west of Puerto Cabezas, a port on the Caribbean, and approximately 150 miles northeast of Managua, the capital of Nicaragua.

The altitude at the mine is around 600 feet above sea level and the climate is tropical, but it is not nearly so oppressively warm as in many parts of the tropics, as the nights are invariably so cool that a blanket on the bed is essential for comfort and the mornings and evenings are delightfully balmy. The annual rainfall is about 80 inches, 90% of which is precipitated during the rainy season which extends from middle of May through December. From January to May, which constitutes the dry season, the climate is ideal.

In the surrounding country for hundreds of miles, the scenery is beautiful, composed as it is of a vast green jungle. Giant trees, such as cedar and mahogany, grow in great profusion and vines and creepers entwine their trunks and branches in a desperate attemt to reach the sunshine at the top. The trees are valuable for timber and are used for construction, since the cost of lumber brought in from elsewhere would be prohibitive. The camp consists of the native village of La Luz, hard by the old mill west of the mine, and the temporary staff quarters, which are south of the village and closer to the mine. A permanent camp is being built at the time of this writing.

Placer Mining Near La Luz

The La Luz or Siuna district, together with the nearby Pis-Pis district, has the distinction of being one of the important gold areas of South and Central America not discovered or known by the early Indians or Spaniards. The history of the Sumo Indians who inhabited this area is uncertain, but in any case, they did not treasure gold or clay charms or figurines as was the case with most South and Central American tribes.

During the latter part of the nineteenth century the collection of wild rubber was an important industry all through the wet tropics of the Western hemisphere. Eastern Nicaragua was a typical rubber district. During this period rubber merchants established headquarters along the various rivers and supplied the Indians with a variety of merchandise, which was in turn taken in trade for crude rubber. A German by the name of Gustavo Schultz was one of these merchants who established his headquarters on Siuna Creek. It is stated that Schultz saw an Indian

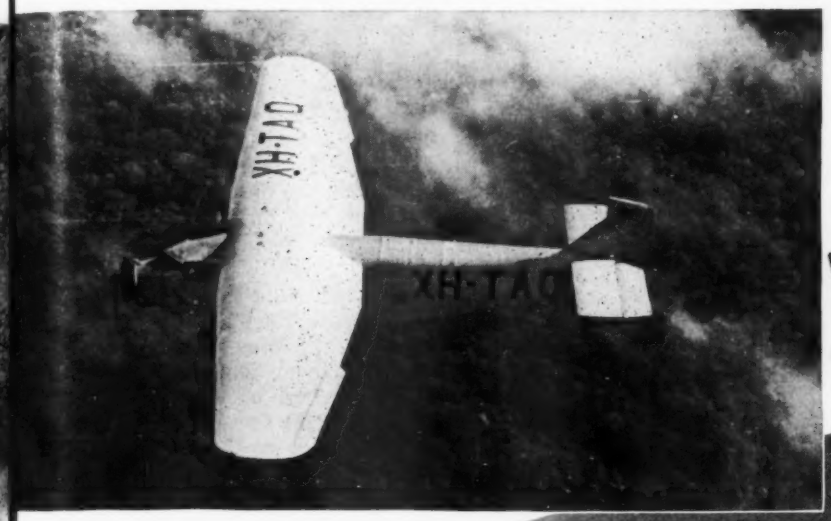
using a gold nugget as a sinker on his fish line. During the year 1888 the Indian showed Schultz a creek, now known as Colorado Creek, which lies adjacent to and partly drains a hill known as Potosi on one side and La Luz on the other. Whether or not the fish line story is correct cannot be definitely substantiated, but it is well known that Schultz found no signs of previous work on Colorado Creek. Schultz does not seem to have been greatly impressed, because he did not start work until 1889, but during that year he did put fourteen men to work on Colorado Creek, first using a pan and later cradles and rockers. Schultz is rumored to have shipped considerable gold out of Nicaragua, together with his rubber, before the matter became known to the Nicaraguan Government. However this may be, Schultz did pass through the Custom House at Bluefields a total of 1,375 avoirdupois pounds of placer gold with a dutiable value of $402,000.00.

During the latter part of Schultz' regime he worked Siuna Creek by means of sluice boxes. He also seems to have located the origin of the placer gold, because he located several claims on Potosi-La Luz Hill.

At a slightly later date gold was discovered on the La Luz side of the hill, in small branches of what is known as Concepcion Creek. The leadership on this side of the hill was taken by a Spaniard named Jose Aramburu. By means of pan and rocker he washed $218,000.00 from the small creeks on the hillside.

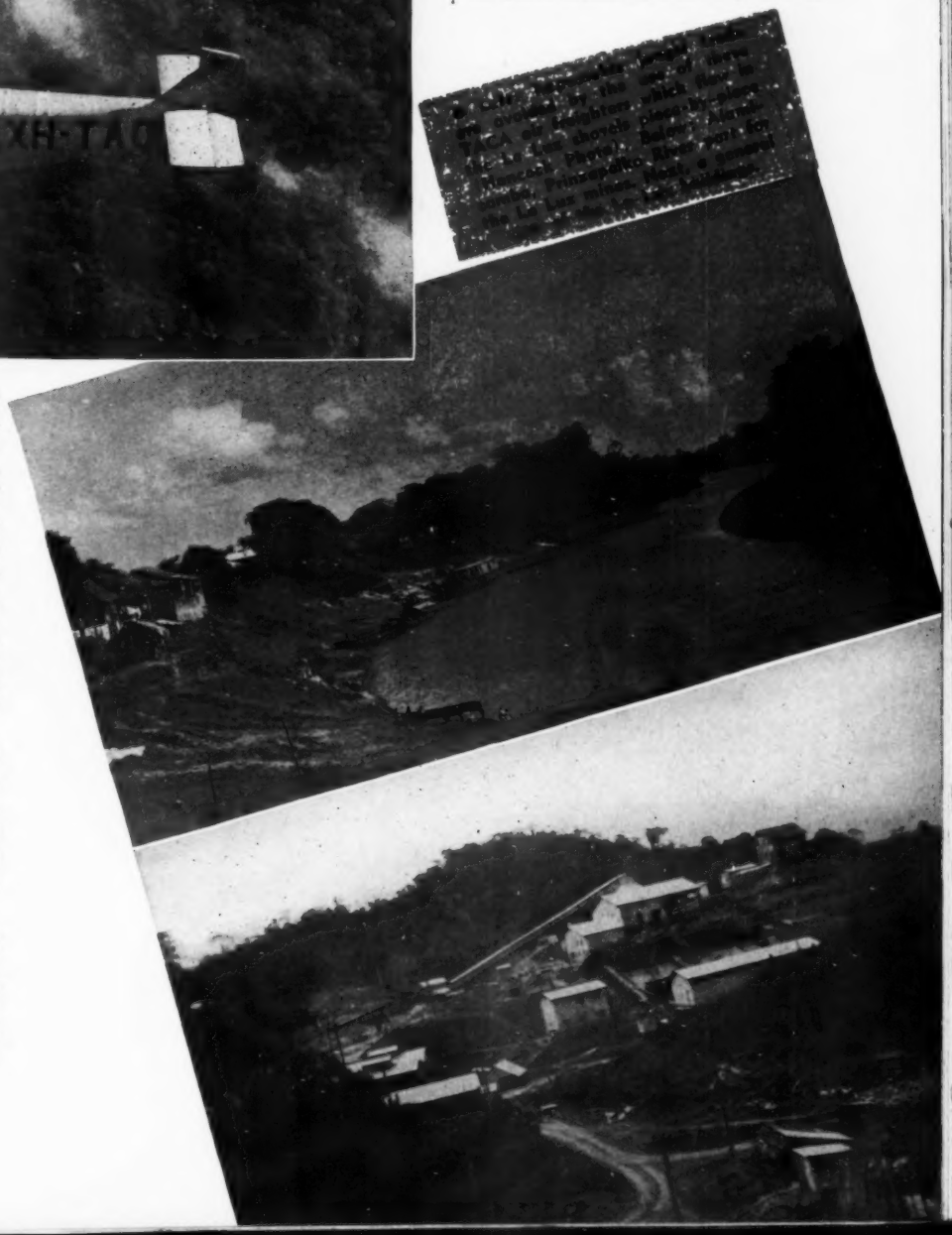
The discovery of the mineral zone on Potosi-La Luz Hill seems to have been the direct result of this placer work. In 1898 Senor Aramburu, with associates, organized a Nicaraguan company known as the Compania Minera La Luz y Los Angeles. This company promptly erected on the property a three-and-one-half foot Huntingdon mill, run by means of steam power, and started to work the richer part of the surface mineralization. By 1905 they had four of these Huntingdon mills in operation. It is interesting to note that Senor Aramburu's assistant during these years was a young man by the name of Adolfo Diaz, who later became president of Nicaragua.

During the year 1905 Senor Aramburu and associates sold control of the property to American interests for a high cash figure. Later the American interests purchased entire ownership and transferred the property to an American company known as the La Luz and Los Angeles Mining Company.



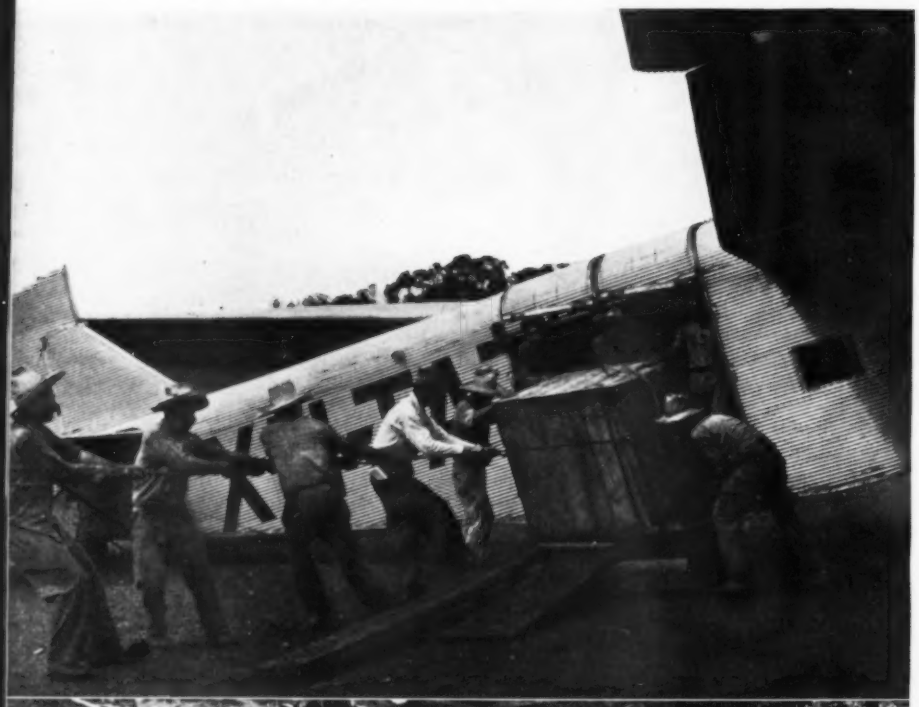
Early Mining Methods

The newly acquired property was quite isolated, the only access



being by river transportation to within six miles of the mine and then by muleback or oxcart over a rough road which, during the greater part of the rainy season, was impassable. The distance by river was 180 miles, which represented a tiresome trip of four to six days, making it difficult and costly to bring in supplies and equipment. When the river was in flood, which was frequent during the rainy season, it was dangerous and often impossible to navigate, as the upper fifty miles contains numerous rapids.

Under these severe conditions, the La Luz and Los Angeles Mining Company operated uninterruptedly from 1909 to 1928. The method employed in winning the ore consisted of driving adits into the hill at an elevation approximately level with the crushing plant, which was above the upper floor of the mill. From the adits raises were driven to the surface to serve as chutes into which the ore was dumped to be drawn out on the adit level and trammed to the crushing plant in one-ton cars on an 18-inch gauge track. The distance to the mill was approximately 1,000 feet. Since there was no crushing equipment capable of handling the hard chert and greywacke that was encountered a short distance below the surface, such material was sorted out and piled up on dumps that grew ever larger until there were over 100,000 tons of ore on four different dumps, consisting mostly of rocks less than 12 inches in diameter and having a value of close to seven dollars a ton at the new price of gold, which is 35 dollars per ounce.



In 1928 a revolution broke out in Nicaragua headed by the bandit Sandino, who paid a visit to La Luz and proceeded to dynamite the mill and raise Cain in general.

In the 19 years between 1909 and 1928, the mill treated 523,139 tons of ore having an average value of $7.56 per ton at the old price of gold, which was $20.67 per ounce. All this production as well as the 100,000 tons piled up on the dumps was extracted above the adit level, which left on the hill slope an open pit approximately 1,200 feet long, 100 feet wide, and 50 to 70 feet deep. In the mill the recovery was $5.16 per ton, or 68%, which would be considered woefully poor showing by modern standards, but since only gravity concentration and amalgamation were employed, it was quite efficient. At 68% recovery, the 523,139 tons of ore treated in the mill yielded the sum of $2,671,149.24 to the owners. It is doubtful, however, that there was much net profit on account of the isolation of the place and consequent high transportation costs.

Exploration Program

From 1928 until 1936 the La Luz mine was idle, the only activity being the growth of the jungle, which proceeded to reclaim the camp for its own, making a sunken garden of the open pit. The price of gold having risen

● Top: A 3,500 lb. section of power shovel is unloaded from an air freighter at La Luz. Bottom: The assembled Bucyrus-Erie shovel goes to work. Note wood lagging at rear of cab to protect the machine during blasting operations (Hancock Photos).

● Top: Assembly of the Bucyrus-Erie shovel at La Luz after all the parts had been flown in by plane (Hancock Photo). Bottom: One of the diesel Autocars is loaded by the P&H ¾-yard shovel out of a dump near the mill.

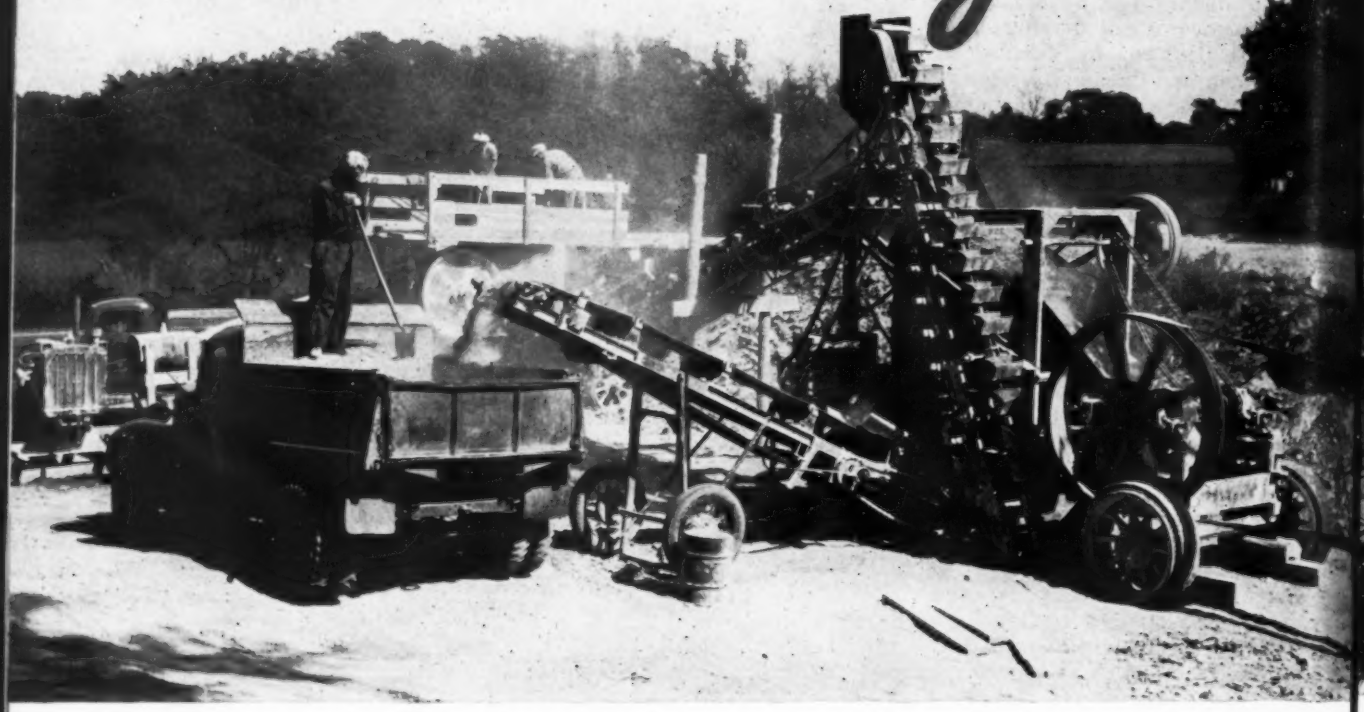
to 35 dollars per ounce and a stable government having been re-established in Nicaragua, American and Canadian investors became interested in the idle mine and arranged a two-year option on the property with the idea of determining whether or not the orebody continued in depth. An extensive exploration program was carried out during the life of the option, consisting of 7,295 feet of drifting and cross-cutting, 1,010 feet of sinking and raising, and 22,993 feet of diamond drilling. All this exploration disclosed an orebody below the floor of the open pit approximately 1,200 feet long, 93 feet wide, and 500 feet deep containing about 5,000,000 tons of ore having an average value of 6.42 dollars per ton. To explore a block of ground of such dimensions, to develop it, and successfully operate it afterwards calls for a substantial outlay of capital, from which no immediate returns can be expected. But there is scarcely any doubt about the ultimate success of an enterprise of this nature, as there is a definitely developed reserve of 5,000,000 tons of 6.42 dollar ore blocked out and conditions are favorable for low mining costs.

The size of the orebody is large enough to resort to open pit mining for 40% of the developed reserve, or 2,000,000 tons. The extraction of this tonnage will leave the floor of the pit 150 feet below the adit level, or approximately 200 feet below the rim of the pit. The east wall, or footwall, of the pit is composed of hard greywacke, which it is expected will stand without scaling, making stripping unnecessary, but the west wall, or hanging wall, consists mostly of weathered andesite, which must be stripped and benched to safely carry the pit down. The tonnage below 150 feet will be extracted by underground mining.

While the increase in the price of gold contributed greatly to the re-opening of the La Luz mine, its resuscitation was really made possible by the modern method of airplane transportation. Since the start of the exploration program, the property has been serviced entirely by airplane. Nicaragua, as well as the other Central American republics, is served by an air line which uses mostly Fords and Lockheeds and employs American pilots. It was started a few years ago by a New Zealander by name of Lowell Yerex, who in addition to being a crack flier had business acumen as well, and gathered about him an organization of experienced, American pilots. Over 5,000 tons of material, consisting of supplies and machinery, have been flown in to La Luz in three years without serious mishap. A port and a landing field have been established at Alamicamba on the Prinzapolka river near end of deep water, which is only 40 miles from La Luz, and all freight is flown to the mine from this port, which is a 25 minute flight. A diesel power boat brings the freight from Puerto Cabezas to Alamicamba. While air transpor-

(*Continued on page 670*)

"Remember the Grease"



Roverud Brothers of Spring Grove, Minnesota, follow this maxim faithfully to carry out their policy of preventing breakdowns rather than repairing them.

THERE IS one maxim prudently observed by cat skinners, shovel runners and truck drivers in southern Minnesota and northern Iowa. The maxim runs something like this—"When you work for Roverud Brothers, remember the grease."

Although Roverud Brothers of Spring Grove, Minnesota, are perhaps better equipped to quickly repair any breakdown on any type of equipment than most firms of highway contractors, they firmly believe in realizing those extra profits that can be had by preventing breakdowns rather than repairing them. Grease is cheaper than repairs, they will tell their men and when a breakdown caused by negligence does occur, it costs the equipment operator his job.

G. A. Roverud, head of the firm, has been in the contracting game since 1909 and for the last 11 years has concentrated his efforts on stabilized base work, graveling, crushed rock, riprap and derrick stone and concrete aggregate. Equipped to handle almost any contract regardless of size, the firm owns and each season has in almost continuous operation, four complete crushing and screening plants and one portable lime mill.

The first unit, sometimes used as a secondary outfit on larger projects, consists of a Pioneer No. 12 jaw crusher and shaker screen and is used as a combination gravel and rock plant. A Wisconsin Foundry No. 1538 primary crusher and feeder with Pioneer rolls and No. 10 screening plant comprise the second unit. The third is a Diamond primary feeder and Pioneer No. 10 screening plant and the fourth is an Iowa 1524 screening plant with a Wisconsin Foundry roll unit. The protable lime mill, recently used for WPA production, is a Wisconsin Foundry No. 16.

Roverud Equipment Line-Up

Complementing the crushing and screening units are a fleet of trucks including 25 Chevrolet one and one-half ton trucks with Heil and St. Paul hoists and bodies, 15 International trucks ranging in size from one-half to five tons, one two-ton GMC and one three and one-half ton GMC, and a fleet of pit trucks. Shovels include two Northwest No. 2, five-eighth yard shovels, one Bucyrus-Erie 16-B five-eighth yard shovel, and one American Gopher one-half yard shovel. The firm operates four International TD-40 tractors, two Bucyrus-Erie five yard scrapers, one Bucyrus-Erie angledozer, one Adams patrol, one Caterpillar patrol, blades, sheepsfoot rollers, pneumatic tired rollers, three

● L[illegible], top: Bucyrus-Erie [illegible]yard shovel working in rocky material. Below: Crushed aggregate is transferred by a portable conveyor unit to the truck loading hopper.

hauled in the sping before the construction season opens. The larger units, the screening and crushing plants, are overhauled outside on the job sites. A complete repair shop is maintained at Spring Grove and power plants, engines, tractors and smaller pieces of equipment are overhauled here. This summer, a new shop was built to replace the remodeled barn the contractors have been using. The new shop is so large that a complete crushing plant can be run in and overhauled inside under the roof.

Use Portable Repair Shop

When each of the units moves onto a job, a complete portable repair shop accompanies it. A

Gardner-Denver and one Sullivan compressor — all equipped with Gardner-Denver S55 jackhammers —and two well drillers. Roverud Brothers also own two semi-trailer outfits, one a 10-ton Kingham trailer and the other a 25-ton LaCrosse trailer.

Mechanical breakdowns, as all contractors realize, are costly. Mechanical failure of one piece of equipment may throw a dozen other pieces of equipment and a dozen men out of work until repairs are made. With their extensive outlay of equipment, Roverud Brothers cannot afford to have production interrupted by breakdowns. Believing in added profits through prevention of breakdowns, every piece of Roverud equipment is completely over-

● Right, top: Constant greasing care keeps the Roverud equipment economically efficient. Below: Spring shackles on a hauling truck are greased with a hand pump.

● Northwest ⅝-yard shovel loads out aggregate rock. Daily service inspections keep the Roverud equipment fit to handle the heavy rock material.

typical portable shop includes a General Electric welder, an Oxweld gas torch, grinders, drill presses, Kohler light plant, good tools and a complete stock of repair parts. On the job, each piece of equipment is greased twice daily, at the start of each eight-hour shift. Most of the repairs made on the jobs are minor repairs to the trucks. On the average job, repair work will consist mainly of valve and spring leaf replacements.

Excessive replacement of dipper teeth is prevented by welding points of an alloy harder than the original manganese on the shovel buckets. The contractors have found that even when working in highly abrasive soil, the wear is not excessive on the dipper teeth when equipped with these points.

The largest individual project ever tackled by the firm was producing and placing 120,000 cubic yards of derrick stone and riprap at Mississippi river dam No. 8 at Genoa, Wisconsin. Riprap for five of the six river dams constructed in their territory was handled by the firm. It was three years ago on one of these river riprap jobs that Roverud Brothers discovered another place where they could prevent breakdowns and increase profits through continuous operation and less frequent replacements.

"We were using the old type wire rope on that job for slings to hoist the big stones into place," N. A. Roverud, son of the president of the firm, said. "Cables were breaking right and left under the extreme weight and strain of continuous jerking. That old rope was brittle, but we thought it was as good as we could get and that there just wasn't a wire rope that would stand up under those conditions.

One of the men on the job had had previous experience with preformed wire rope and suggested Roverud Brothers give it a trial.

"It was pretty hard to believe," commented Mr. Roverud. "The preformed wire rope lasted more than twice as long as the old wire rope did under the same usage. When we saw how good it was for this type of service, we replaced the rope on all our equipment with preformed wire rope. We have been using it ever since and it is real economy. Breakdowns are expensive, not only from the angle of replacements, but from the standpoint of time lost when machines are idle.

Shovels Worked Under Severe Conditions

Working on a variety of assignments, Roverud shovels especially are subjected to severe conditions. The preformed wire rope on these shovels is abrased by the fine sand and grit of the pit, loads continually change and the rope is jerked taut, then suddenly released as the shovels strain at the big stones, then dump their loads. Last season, the contractors worked one shovel 16 hours every day on two eight-hour shifts for a period of nine months. This shovel was equipped with preformed wire rope and during the entire season, despite the extreme working conditions, there were only three cable breaks.

When the firm was producing and placing riprap on the river dams, they were faced with two problems. The first was getting at the stone which, in southern Minnesota, lies on the tops of the bluffs overlooking the Mississippi river. Before a pit could be blasted open and the shovels and crushing plants moved in, it was necessary to build truck roads up the steep banks. These roads built, another problem confronted the contractors in moving the stone out to the dam site over the soft sand and marsh land of the river bottoms. They resorted to mats and planks to overcome this difficulty.

A great deal of the work done by the firm is stabilized base or rolled rock road base. On the ordinary stabilized base job, the rock is laid out on the sub grade in the specified depths with a spreader box, leveled with maintainers and watered. The base is first compacted with sheepsfoot rollers, then rolled with penumatic tired rollers and touched off with a blade. A cut back seal coat is spread and mixed with blades and finally rolled to complete the base.

Superhighway for Manchuria

Survey of the projected Darien-Harbin superhighway has been completed and the government has stated that the highway would be constructed under a 15 year program at a cost of 150 to 160 million yen. The plans indicate a two track road, 15 meters (49 feet) wide, with a grass lane in the middle, allowing a speed of 150 kilometers (93 miles) per hour. A similar highway is also to be constructed between Antung and the port of Tatung, under construction at Yalu estuary.

Equipment

you ought to KNOW ABOUT

When writing to manufacturers please mention Excavating Engineer.

Universal Pacemaker quarry plant

Manufacturer: Universal Crusher Company, Cedar Rapids, Iowa.

Claims: Equipped with a jaw crusher for primary reduction and a new "two-in-one" roll crusher, one-half of each roll being ¾" in diameter smaller than the other. Secondary reduction is

done in two steps, smaller of the divided rolls giving an initial secondary crushing and the other half, fed from the second deck of the 4'x8' vibrating screen giving a final secondary crushing. Material can be fed through faster, rock coming in and out crushed in a continuous stream. New roll principle gives a larger capacity, combining the output of two roll crushers in a single unit and provides saving in weight over the use of a larger roll crusher to do the same job. Crushing cycle further speeded up by the use of the Universal Rotavator, a rotary elevator, an underslung conveyor and other short cuts achieved in the conveying system. Lower center of gravity makes it roadworthy and easier to maneuver into place on quarry floors. Capacity of 100 to 130 yards per hour without crowding has been reported on the first installations.

Write to the company for further details.

P&H Biglode dragline bucket

Manufacturer: Harnischfeger Corporation, Milwaukee, Wisconsin.

Claims: Balanced construction with arch, body, hitchplates, bucket lip and runners welded into a single unit. Flared lip and teeth assembly to provide digging action similar to a round-nose shovel. Conventional number of hitching parts reduced. Drag cable can be replaced without removing the pins. Teeth have reversible points. Bucket available with capacities from ⅜ to 4 cubic yards.

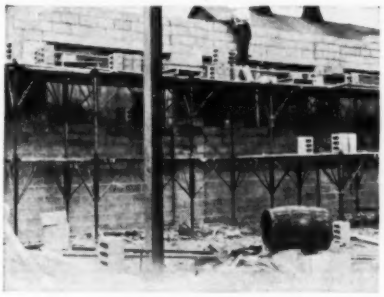
Write to the company for further details.

M. H. S. "Quik-Set" safety scaffold

Manufacturer: Mechanical Handling Systems, Inc., 4600 Nancy Avenue, Detroit, Michigan.

Claims: No screws, bolts or clamps are used, and no tools of any kind are required to erect or disassemble the scaffold. Complete outfit is erected from single units.

Consists of square section tubular steel brace and corner post units of rigid construction with electrically welded parts. Unique design of various units permits erection in straight line, in corners, around rectangular or circular construction either inside or outside. Bridging over obstructions is easily accomplished with simple truss units. Steel floor sec-



tions are supplied which may be placed at any point in the scaffold. Detachable ladders, adjustment posts for erection or uneven surfaces, brackets for "catwalks" and for holding material, casters for use on interior work, and a simple, safe skip-hoist for lifting materials to the proper level are also provided.

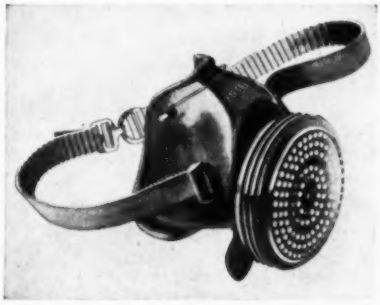
Write to the company for further details.

Willson Bantam respirator

Manufacturer: Willson Products, Inc., Reading, Pennsylvania.

Claims: Lightest weight throwaway filter-type respirator yet to receive the U. S. Bureau of Mines approval. Result of constant research and development by Willson engineers who have been working to meet industry's demand for protection without loss of working efficiency.

Bantam is light in weight and



easy to breathe through and can be worn for long periods of time without causing any noticeable discomfort or slowing down of the worker. All rubber face piece can't be crushed out of shape.

Write to the company for further details.

Acheson Colloids lubricant

Manufacturer: Acheson Colloids Corporation, Port Huron, Michigan.

Claims: Lubricant to which dust does not adhere. Found useful in eliminating "sticking" of clamps, tangent and leveling screws of transits and levels, for surveying work. Consists of Acheson Colloidal graphite suspended in tetra-chloride. When applied the carbon tetra-chloride evaporates, leaving a fine film of graphite serving as a "dry" lubricant.

Write to the company for further details.

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A Tribute to the Turnpike Contractors

Contractors, 155 strong and from eighteen states, have achieved, in building the 160-mile Pennsylvania Turnpike, fulfillment of a motorist's dream—a broad, lengthy highway, with almost no curves nor hills to hinder travel, no intersecting traffic and no speed limit except the ability of the individual automobile. These contractors have created something tangible and definite for the enjoyment of the car-driving public. They have played an outstanding part in a project which stands today as fresh physical evidence of modern engineering diligence and contracting energy.

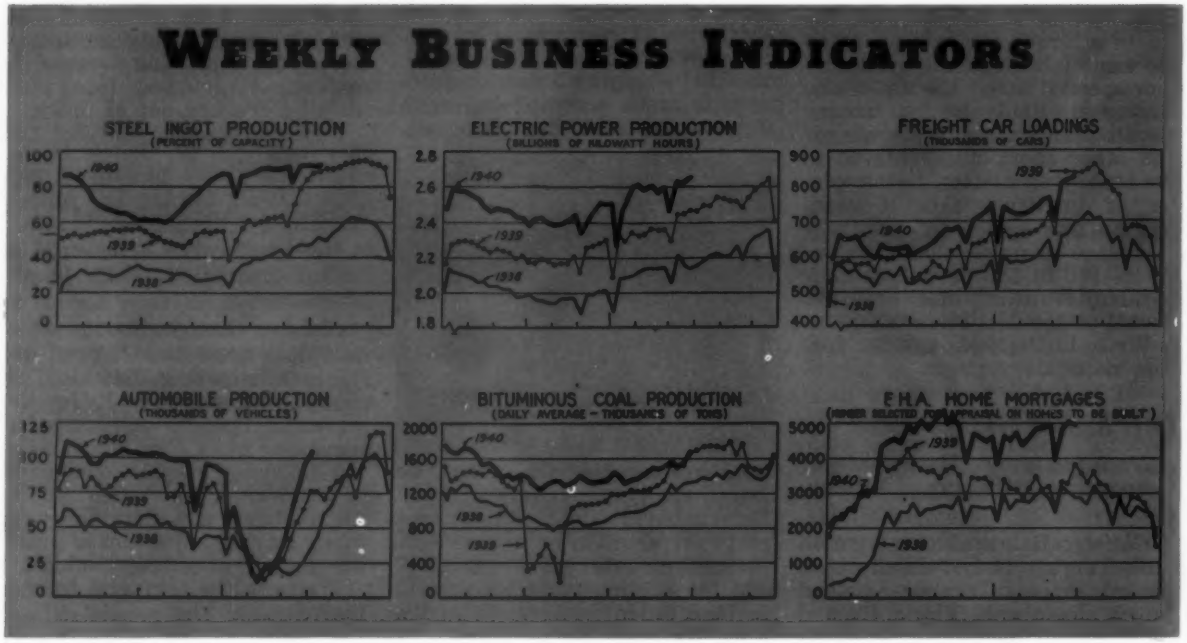
Of particular interest to contractors everywhere is the fact that this new super-route, which connects Pittsburgh and Harrisburg by a ribbon of concrete that stretches through the formerly insurmountable mountain barriers, highlights the inestimable value of the contract system in road building. Without the contract system, such an achievement in highway construction, under the pressure of the unusually short time limit of 20 months, would have been impossible. Accomplishment of this project, based solely on the operation of the contract system, guaranteed to the public a highway facility at a minimum cost consistent with plans and specifications and within a definite period.

Competitive bidding, foundation of the contract system, assured this economical job, a matter of singular importance, since the turnpike is to be self-liquidating from tolls collected within 14 years. Without the contract system, the time needed to complete the job would have been excessive and the cost of a self-sustaining project such as the turnpike would have been almost too great for consideration. Contractors gambled against time, weather, material-supply conditions and labor supply. They met all requirements at a guaranteed cost and, under the program worked out, the public took no chances. Engineers drew up their plans, wrote their specifications, noted the price limitations and stated the time in which the work was to be completed. From the contractors, they got what they wanted, when they wanted it and the way they wanted it.

Labor on the turnpike was paid prevailing wage rates and the laborers, throughout the progress of the work, showed pride in their accomplishments.

Perhaps, in years to come, the $70,000,000 turnpike will be projected farther across the country. When capital is available, it will be an ideal enterprise. The country could use many more of this type highway. Similar projects can do much to help solve the nation's unemployment problem. They can be self-liquidating and should increase the wealth of the country. However, if the contractor is taken out of the picture, the guaranteed low cost disappears, the project becomes economically unsound and undesirable, proper employment is not furnished and the result in travel savings may never be realized.

The 15,000 men employed on the turnpike have done a remarkably fine job. Considerable credit must go to the planners, who translated a knowledge of the public's needs into action; to the manufacturers, who, working in close cooperation with contractors, developed new equipment and new techniques that should assure greater roadbuilding economies in the future, and to the contractors themselves, who brought out of the abstract a



visible, usable, advanced type of superhighway that will endure for years to come.—*Road Builders' News.*

September Construction

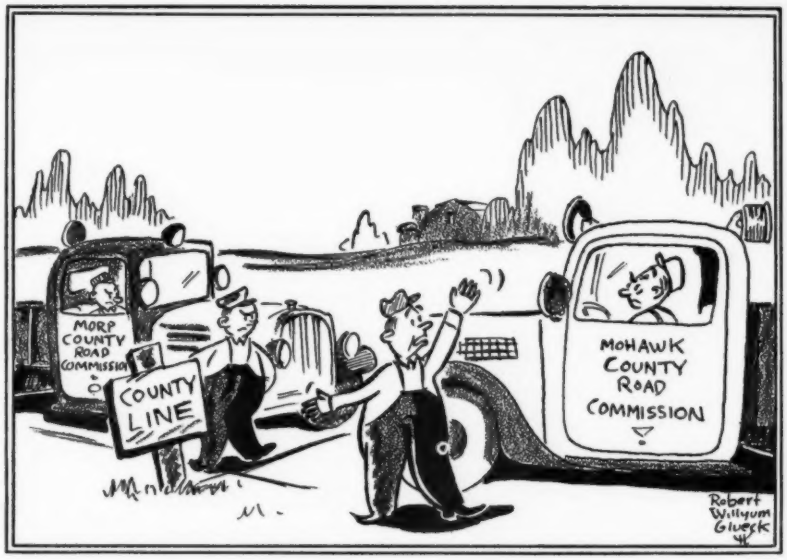
The September total of contracts awarded in the 37 states east of the Rocky Mountains was the highest recorded for any September since 1929, according to F. W. Dodge Corporation. The dollar volume, amounting to $347,651,000, represented a 7 per cent increase over September, 1939. Since publicly-financed construction showed a fractional decline as compared with the corresponding month of last year, this increase was the result of an upswing in private construction which rose from $179,011,000 to $203,655,000.

The rearmament program, bringing with it industrial expansion, was again reflected in the increase in awards for manufacturing building. The volume for this class of construction rose from $20,738,000 in September, 1939, to $37,980,000 last month. Commercial building, which follows closely the industrial production cycle, also contributed to the 23 per cent increase over September, 1939, in contracts awarded for non-residential buildings as a whole.

Residential building, which amounted to $152,372,000 in September, came within one per cent of the August total, which was the highest recorded for any month since July, 1929. Awards for one-family dwellings, amounting to $104,822, continued to lead all other residential classes. Miscellaneous shelter projects, which include barracks for the armed forces, also contributed to the residential building gain by rising from $2,754,000 in September, 1939, to $12,063,000 last month.

Coal Producers Score Guffey Act

Orders by the Department of the Interior making effective a schedule of minimum prices for bituminous coal will increase the fuel bill of the consuming public by from $44,000,000 to $60,000,000 just at the winter buying season, according to J. A. Howe, executive vice president of the Truax-Traer Coal Company of Chicago. Mr. Howe is chairman of the producers committee which is supporting the Allen amendments to the Guffey Act.



"They want to see our passports!"

Mr. Howe's statement was given out in Washington, New York and Chicago following the announcement from the Department of the Interior that the minimum price schedule, which was deferred over an extended period, was finally put into effect October 1. Mr. Howe's statement said:

"After many delays, the Department of the Interior, which administers the Guffey Bituminous Coal Act, has put into effect as of October 1, 1940, a schedule of minimum prices designed to protect the coal industry against loss. Although the legislation was passed approximately three and a half years ago, and expires in less than seven months, the department has just now arrived at the enforcement of its major provision.

"This delay has been due to the impracticality of the legislation in its present form. The schedule means that there will be 500,000 different prices for bituminous coal. The difficulty of operating under that kind of a price structure is manifest.

"More important, however, is the increase these new prices will mean in the nation's fuel bill. This increase may be estimated conservatively at $44,000,000, and may be as high as $60,000,000. Efficient elements of the coal industry do not need to place this additional burden on the public just at the beginning of winter buying. Unquestionably it will stimulate the trend to competitive fuels—oil and natural gas—and in industry to those and hydroelectric power. That will help neither the coal miners nor the coal operators.

"Obviously the reason for these new prices, which the Department of the Interior has been so reluctant to adopt, is the endorsement of this legislation in the platform of the Democratic Party. It is, of course, impossible for the party to seek return to power on the basis of the Guffey Act if the administration continues to shadow box with its provisions. The Department has reached the place where it must risk the reaction among consumers, and give the law a trial. If this is good legislation, as the platform suggests, it must finally be made effective so that the people will enjoy its benefits.

"The fact of the matter is that the Guffey Act is virtually impossible of administration. It discloses the difficulties encountered when government undertakes the control of a large, complex industry. The schedule of minimum prices involves many inconsistencies, ambiguities and injustices. Complaints from consumers have been numerous and emphatic in the past and they will continue to be numerous and emphatic. We now face, after three and a half years, a test of the price fixing provisions of this legislation. The Public reaction will be interesting.

"It is fairly evident that the central purpose of the legislation —the improvement of the position of the coal industry—will not be

(Continued on page 651)

Chicago's First Subway

(Continued from page 637)

tion and drainage facilities for the subway proper.

The blue clay encountered in sinking the shaft on the Paschen contract was so sticky that the clamshell bucket swung into the shaft opening by a Northwest machine had to be loaded by hand. This operation was typical of all the air vent and pumping station excavation on this contract.

Traveling further along the State Street Subway route, we found the next surface excavating activity on the Kenny Construction Co. contract where two Bucyrus-Erie clamshells, a 20-B and 22-B, spotted on each side of Clybourn Avenue, were busily digging pumping station shafts. Both machines were equipped with Williams clamshell buckets, the 20-B with a ¾-yard and the 22-B with a ⅝-yard bucket.

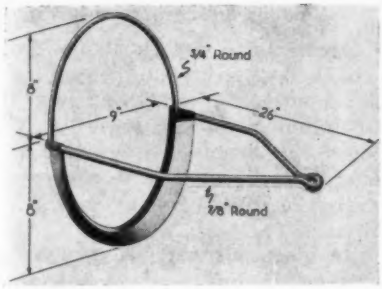
The machines were loading to 10-yard Autocars which made a 2-mile round trip to Chicago's lake front, where all spoil material from the subway is either used for shore fill or loaded on barges to be dumped into the lake. To facilitate the handling of the sticky blue clay, Kenny's men added some water to the shaft excavation. This enabled the clamshells to grab and release the blue clay with greater speed, thus hastening an otherwise tedious digging job.

On September 15, 1940 general open-cut operations on the Chicago subway were about 17% complete.

Open-Face and Shield Tunneling Methods

Meanwhile, 45 feet below the surface of Chicago's teeming

● Top to bottom, (1) The subway will pass under the Chicago River at this point, note twin-tubes tied up at left bank. (2) General view of the twin-tubes in drydock. (3) Concrete dry batched in this Koehring Paver is locked under pressure and sent down to line the tubes below. (4) Placing reinforcing steel in preparation for concrete pouring operations. The Chicago freight tunnel can be seen in the background.



● Sketch of the steel clay knife that is successfully handling Chicago's sticky blue clay on subway hand mining contracts.

streets, tunnel excavation operations continue day and night; rain, snow or shine. Two methods of tunneling, open-face and shield, are being used in advancing the subway bore. Because the blue clay underlying the Chicago area is softer and more plastic in the "Loop" business district than elsewhere, and because building foundations and utility lines are much more numerous here, and the building and traffic loads are heavier, city engineers specified the shield method of tunneling for the State and Dearborn Street sections south of Lake Street. (See map on page 636.)

On the balance of the present contract, with the exception of a twin steel tube carrying the subway across the Chicago River, the bore was advanced through an open-faced, benching method.

These methods of tunneling were decided upon after detailed examination of subway routes. Test bores were made at 300-foot intervals to a depth of 55 feet through the use of 2-inch Shelby tubing. Specimens collected from this procedure, as well as specimens collected from the headings of the open-face tunneling contracts, enabled city engineers to arrive at a complete picture of the subsoil's moisture content, compressive strength, and plasticity.

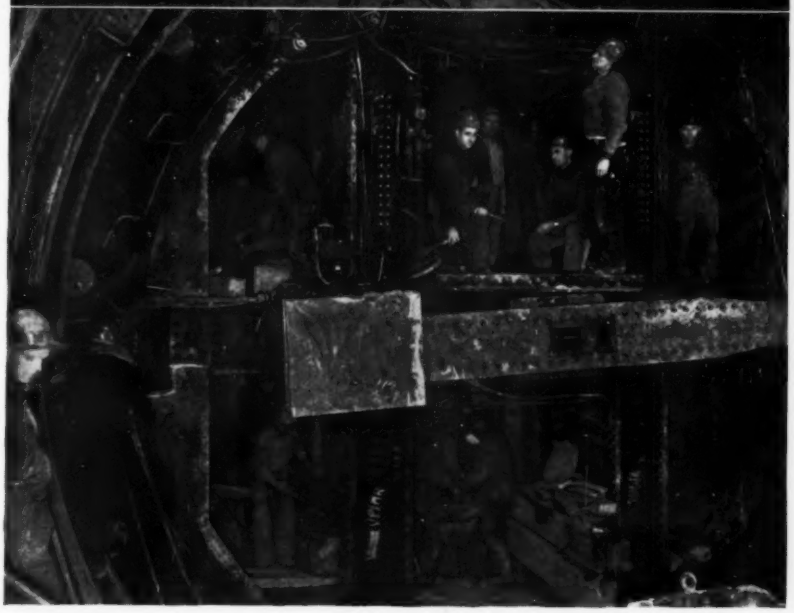
Connecting link between subway bore and street surface on each contract is a top plant that allows entry of men and necessary supplies for tunneling operations. These plants, which are similar on each contract, house a transformer station, compressor plant, electric cage hoist, change houses, and battery charging stations for the tunnel locomotives and shops.

In the interests of safety, dual sources of power and dual compressed air and hydraulic power plants were required. Excavated material was also brought to the surface and loaded to trucks at these plants.

On an inspection trip through the subway bore in the "Loop" section, we pass through one of these plants on our way to the airlock, that all-important port of entry to the subway bore. Entering the airlock, we wait for the pressure to reach 12 pounds per square inch, which is the pressure maintained in the subway bore. Wreathed in milky vapors caused by the pressure change, we step out the opposite end of the airlock into the subway proper.

Here, 45 feet below the rush and roar of the "Loop," men are pitting their skill and strength against Chicago's blue clay. Walking through a section that had already received its reinforced con-

● Bottom: Rear view of a shield used under State Street in the "Loop." Note the hydraulic jacks along the shield's rim. Top: Material lock in the South State Street section of the subway. All material must enter and exit through locks of this type.



● Hand excavated clay on open cut work on the Kenny contract is loaded to Autocars by a Bucyrus-Erie 10-B swinging a caisson bucket.

crete shell, we soon arrived at the tunnel face where the shield crew was in action.

Four of these steel shields, which resemble a housewife's biscuit cutter built on a grand scale, are in use in the "Loop" area. Each shield weighs 225 tons, is 19 feet 6 inches long and the inside diameter at the tail piece is 24 feet 10½ inches. As mining proceeds at the face of the shield, hydraulic jacks are used to drive the shield forward. Before each forward shove, a ring of heavy steel lining, reinforced by ribs, is erected inside the tail piece of the shield. This lining provides support for the walls, and a solid brace when the shield is shoved forward. Thus, as the shield advances, this lining emerges from it in a continuous ring forming an immediate support for the tunnel walls that will soon be concreted.

Advancing 33 inches with each shove of the twenty-four 200-ton hydraulic jacks, arranged at equidistant points around its structure, the shield makes a full face cut, eliminating necessity for benches. The pressure of the advancing shield causes the plastic blue clay to flow through the six compartment openings of the shield.

Excavating With Clay Knives

Two or three men work in each of the six compartments cutting and loading the excavated material to dump cars. This excavation procedure is based on the plastic characteristics of the blue clay, which is of a consistency that permits slabs or slivers to be cut from the tunnel face by U-shaped hand or power knives. These slabs are handled by muckers and thrown into the 2 to 4-yard dump cars.

Tailored to work in the blue clay, the power knives are a Chicago innovation. Consisting of a U-shaped steel blade mounted on a steel rod frame (see sketch on page 649) these knives were powered by Ingersoll-Rand air motor hoists usually mounted well above the floor and from 30 to 50 feet back from the tunnel face. An arrangement of snatch blocks, hooked to the steel ribs or wall plates, enabled the knife operators to work in any direction desired. These clay knives were also used in the open-face sections where excavation was handled by the benching method, the clay being taken out in three lifts.

Disposal of excavated material on the loop work is considerably facilitated by the Chicago Freight Tunnel, a system of concrete-lined passage ways 6 feet wide and 8 feet high, which was built in 1912 as a means to deliver freight to, and remove refuse and ashes from, downtown Chicago. The regular 4-yard cars of this freight line are carrying much of the muck from the new subway bores. As the new subway intersects this old freight tunnel in many places, only certain sections in the State Street, Dearborn Street, and Lake Street areas will remain in service. However, some parts of it are being relocated.

Placing Concrete Lining

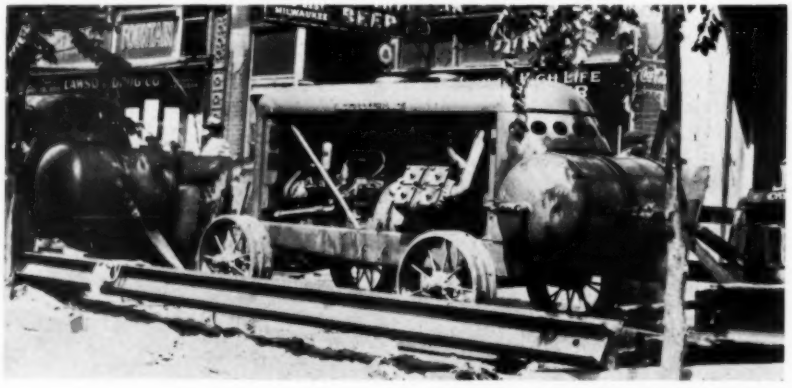
Concreting operations in the tubes follow about 500 feet behind the placement of the primary steel lining. On the majority of contracts, concrete is mixed at the surface in pavers and delivered to the tunnel through pipes, fitted with airlocks, which have been driven from street level.

Several methods are used for placing the concrete tunnel lining. On some contracts concrete sent down from the surface runs through hoppers that are equipped to pump or blow the concrete directly to the form. On one contract the mixed concrete is hauled in cars direct to pneumatic placers for the invert, side walls and arch. With the exception of one contractor who used a pump at the surface, pumping directly into the forms, the above methods are generally followed on all contracts.

As an average of 30 feet is mined out in each heading every three shifts, 30 feet of invert and arch are poured in the following three shifts. Alternating between the twin bores in this manner, excavating and concreting crews work continuously and average 15 feet a day in each heading.

One contractor, working in just one direction, used a bridge to span the invert as it was being excavated. Working a full mining crew for two shifts in each heading, and a crew mining and pouring the invert for one shift, a progress of 25 to 30 feet every 24 hours was maintained in each of the two headings.

● Ingersoll-Rand compressors furnish power for pavement breaking on the Paschen contract.



Interesting construction methods were used to carry the State Street branch of the subway under the Chicago River. As tunneling under the river would have resulted in a grade too steep for a subway station planned between Randolph and Lake Streets, city engineers decided to place twin pre-fabricated steel tubes under the river to solve the problem. Constructed in a South Chicago drydock, this twin-tube section was floated 18 miles to its final resting place across the Chicago River. Built of 5/16-inch steel plate and covered inside and out with reinforced concrete, the section is 200 feet in length.

Placed in a trench dredged across the river by a Whirley derrick scow equipped with a three yard clamshell bucket, the twin-tube section was lined up to the subway headings with such care that the final connection was only ¼ inch off. After the section was submerged into position, divers poured concrete collar seals between the pre-fabricated section and the cofferdams of the tunnel headings. Next, the upper part of the outside concrete covering, which had been left off so the unit could be floated, was poured and the trench backfilled. There is only a 5-foot layer of earth over the sunken tubes.

Because of the increased hazard of compressed air work, Chicago subway builders are following a comprehensive, planned safety program. Under the guidance of a chief safety engineer and five assistants, a continuous 24-hour safety servicing of the entire project is carried out by city engineers. As a result of this extensive program, accident frequency on the subway is consistently lower than on other projects doing similar types of work.

At the present rate of progress, Chicago's first subway will be ready to accommodate the city's 100,000,000 potential passengers per year sometime during 1941.

Chicago's Department of Subways and Superhighways is headed by Commissioner Philip Harrington. Ralph H. Burke is the chief engineer on the project and is assisted by the following personnel: V. E. Gunlock, engineer of subway construction; P. F. Girard, engineer of subway design; and R. S. Knapp, assistant subway engineer in charge of surveys.

Thank God for America

A prayer of thanksgiving for all Americans is presented on the following two pages. Written by Excavating Engineer editors, with art work by A. W. Steel, the two-color spread has been designed for mounting on bulletin boards or framing.

Reprints suitable for framing (unfolded) are available for the handling and postage cost of 6c each or 40 for $1. Please send two 3-cent stamps for your copy (send check or money order for larger quantities) to Excavating Engineer, South Milwaukee, Wisconsin and it will be mailed promptly.

Score Guffey Act

(Continued from page 647)

achieved. What the industry requires is not paternalistic control by government, but encouragement and a chance to work out its own future.

"The theory of the legislation is that the minimum price schedule increasing the cost of coal to the consumer would permit the mines which are now unprofitable to make an earning. Much of the industry, however, does not need this assistance and could stand on its own feet if the burdens imposed by the government in its alleged attempt to be helpful were removed. Substitute legislation amending the Guffey Act has been introduced. It provides for the creation of cooperative marketing agencies for coal, the legality of which has been upheld by the United States Supreme Court. That would not give the government control of the industry, but it would enable the industry to put itself in a sound financial position and give the government sufficient authority to protect the interests of the consumer from unduly high prices.

"What is required primarily is for government to drop its conception that coal is a sick industry and deal with it on its merits. The Department of the Interior should investigate some of the progress that has been made in coal mine operation during the last dozen years."

● Left: Concrete locked down from the surface is relayed by this hopper to subway forms. Right: Completed single tube section ready for the subway tracks.

Thank God for Ame

Thank God for America — for our fertile fields and wooded hills; our tumbling creeks and fish filled lakes, our roaring factories and teeming cities. Thank God for America with room to breathe the air of freedom and the right to shape our individual destinies as best we can.

Thank God for America where we walk with heads up and smiling eyes, where home is our castle and where our thoughts are our own. Thank God for the laughter we hear all about us, the kidding, the arguments, the hustle and bustle of our busy lives.

Thank God for America with our freedom of worship, freedom of speech and freedom of press; where we can read what we choose, say what we think, and listen to any opinion voiced on the street or over the air. Thank God for our free education, our free libraries, our free parks and playgrounds. Thank God for our right to work where we choose and to quit when we please.

Thank God for America where every girl is a queen and every boy may be a president. Thank God for our custom of free marriage with no walls of caste or privilege to straightjacket our love. Thank God for our freedom of parenthood, our right to have as many or as few children as we desire.

Thank God for a land as rich as America, where we can afford more food, more clothes, more cubic feet of hous-

erica—

ing, more miles of highway, more automobiles, more telephones, more radios, more refrigerators, more savings, more insurance, more comforts and more luxuries than any other people on earth.

Thank God for America where the highest measure of a man is what he has done for other men, where every man can rise as fast and as far as his ability and initiative will carry him, where every man shares the responsibility of choosing the men who decide the destinies of the nation, where every man can work and hope and dream for a future richer than his past.

Thank God I am an American!

Shots from the FIRING LINE

Foreman New AGCA Head

President H. B. Zachry announces that by unaminous vote of the executive committee Herbert E. Foreman has been appointed managing director of the Associated General Contractors of America to succeed Edward J. Harding, who died suddenly October 5. James D. Marshall has been appointed assistant managing director to succeed Mr. Foreman.

Mr. Foreman has been assistant managing director of the association since 1934, and has been a member of the staff since 1929. Mr. Marshall has been manager of the heavy construction and railroad contracting division since 1934 and is secretary of the Labor Relations Committee.

Before his appointment as assistant managing director, Mr. Foreman had been field secretary and assistant engineer of the association. He is a native of Dayton, Ohio. After his graduation from Ohio State University in 1919 with a degree of Bachelor of Civil Engineering, he taught for a year at the university.

He held various engineering positions in connection with construction work in Illinois, Indiana, Ohio and Pennsylvania before becoming a resident engineer for the Ohio State Highway Department. He was successively traffic engineer, executive secretary and assistant to the director of the department, at Columbus. He received his Bachelor of Law degree in 1928 from Franklin University. He is a member of the Ohio State Bar Association and the Columbus Bar Association.

Highway Research Board Meets

The twentieth annual meeting of the Highway Research Board of the National Research Council will be held in Washington at the building of the National Academy of Sciences the week beginning December 2.

Sessions of the Board will be held on Wednesday, Thursday, and Friday, December 4 to 6. In addition, several departments of the board will hold open meetings on Tuesday, December 3.

According to the tentative schedule released by Roy W. Crum, director of the board, the departments of design, materials and construction, maintenance, economics and soils and the committee on roadside development have scheduled meetings on Tuesday, December 3 which will be open to the public.

Board sessions will start Wednesday morning, December 4 with the discussions centered about materials and soils investigations. On Wednesday afternoon will come topics relating to highway economics; Thursday morning, traffic; Thursday afternoon, design and roadside development; Friday morning, finance and maintenance.

● **A portion of the exhibit area at the 1940 Metal Mining Convention and Exposition held September 16 to 19 at Colorado Springs, Colorado. Over 1,700 people attended the convention.**

Penn Turnpike Opened

The famed Pennsylvania Turnpike, 160-mile superhighway between Harrisburg and Pittsburgh was opened to the public on October 1, 1940.

No official ceremony marked the opening of the "dream road" for public use. Authority for the opening of the highway came from the Pennsylvania Turnpike Commission, headed by Walter A. Jones.

Eighty New Airports for Canada

Eighty airports are being constructed this year by the Canadian Department of Transport to aid the British Commonwealth Air Training Plan. The plan was announced last December and a number of completed airdromes have already been turned over to the Royal Canadian Air Force for use in training aviators for defense purposes.

Although the airport requirements for civilian aviation purposes usually take at least a year, it is predicted that the entire eighty will be ready by the time winter sets in. This result has been made possible by working night and day, with the aid of modern mechanized equipment. On one field, for example, the number of men employed has varied from 150 to 600, working in shifts. The mechanical equipment has been operating approximately 23 hours a day, with only short stops for refueling, oiling and overhauling. The work is under the supervision of Minister of Transport C. D. Howe.

Don't Forget . . .

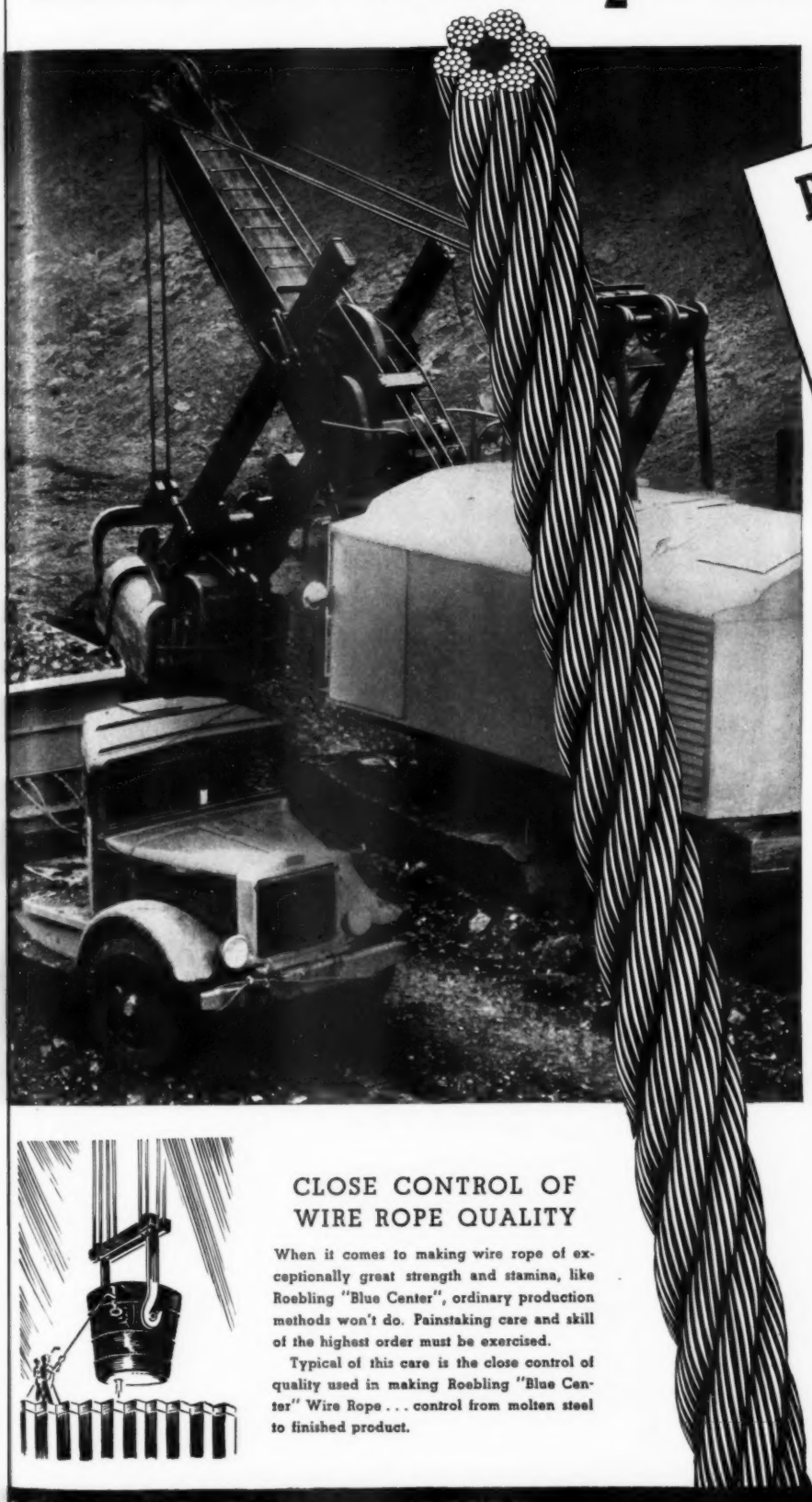
to make your plans to be in New York January 27, 28, 29, 30, and 31 for the most important convention the American Road-builders' Association has held in recent years. Defense roads, Pan-American highway progress, airport construction and many other topics are slated for discussion at this year's ARBA meeting. Keep abreast of the fast changing times and plan to attend!

Clay Products Convention

Convening November 12, 13, and 14 at Roanoke, Virginia, the Structural Clay Products Institute is planning a discussion of the following topics: "Housing—Government and Private," "The Defense Program and the Role of Clay Products," and "The Upturn in Construction and Home Building."

Members of the clay industry have felt an increased demand for their products as a result of the general improve-

Greater Safety...Longer Life



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Use Roebling "Blue Center" on all your shovels, scrapers, drag lines and other rope-rigged equipment. Keep accurate service records. Compare. We are confident you will agree with other users—that Roebling "Blue Center" assures the utmost of safety—and lowest rope replacement cost.

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When it comes to making wire rope of exceptionally great strength and stamina, like Roebling "Blue Center", ordinary production methods won't do. Painstaking care and skill of the highest order must be exercised.

Typical of this care is the close control of quality used in making Roebling "Blue Center" Wire Rope . . . control from molten steel to finished product.

JOHN A. ROEBLING'S SONS CO.

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ROEBLING "BLUE CENTER" The Finest of all Roebling Wire Ropes

ment in construction activities caused by present defense, as well as home, building.

Illinois Plans Five-Year Road Program

News that the State of Illinois soon will announce a comprehensive five-year road-building program was told to approximately 300 members of the Illinois Road Builders Association and their guests as they celebrated the first annual Road Builders Roundup at the Aurora Country Club on September 24.

No details of the program were announced, although it was indicated that primary and main highways, as well as grade separations and bridges, would be included. Long urged by highway leaders, President Herbert R. Anderson's announcement to the road builders was the first indication that programmed construction would be adopted.

The association adopted a resolution commending the director of public works and buildings, the chief highway engineer, and other state agencies for their constructive decision.

A second resolution was adopted, urging the state to return a "proportionate share" of all gas tax revenue collected from Cook county to that county annually for improvements on state roads within the county.

The resolution set forth that millions are collected in Cook county for the state gas tax and that only a small part of these moneys are expended by the state within Cook county. It said that 50 per cent of the population of Illinois and 50 per cent of all motor vehicles are in Cook county. It also said that "there still remains a large number of uncompleted improvements on state highways within Cook county" and reviewed the great benefit to all citizens of Illinois from the standpoint of convenience, accessibility, safety and economy if the system could be adequately improved and modernized in Cook county to facilitate the progress of heavy traffic.

GATKE Swinging Frictions For TOUGH JOBS

GATKE Single Cone Moulded Swinging Friction

Below: GATKE Double Cone Moulded Swinging Friction

Another GATKE Achievement is eliminating trouble and saving money for operators.

On heavy stripping and other tough jobs GATKE improved Swinging Frictions are *really* going to town' with—

TREMENDOUS POWER — no let down when things get hot.

SMOOTH ACTION—no grabbing or chattering.

LONG WEAR beyond comparison.

There is a GATKE Friction Material for every requirement of shovels, drag lines, cranes, hoists, or tractors that will do the job better and last longer.
Whatever your requirements send data on the application for recommendations.

There is a GATKE Swinging Friction developed to do your job RIGHT by men who understand your requirements. Just send data on your application for information.

Gatke QUALITY BRAKE BLOCKS AND FRICTIONS

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Let Branch Canal Work on Shoshone Project

A contract for the construction of an additional 28 miles of branch canals or laterals to serve approximately 5,600 acres included in the Heart Mountain division of the Shoshone project, Wyoming, has been awarded to Ray Schweitzer of Los Angeles, California, by the Bureau of Reclamation. The successful bid of $166,196.90, was the lowest of nine proposals received and opened by the bureau at its Cody, Wyoming, office.

The contract covers earthwork and structures for three laterals, designated at Laterals H-89, H-103, and H-105, and some sublaterals. Structures include checks, weirs, drops, and siphons under the tracks of the Chicago, Burlington, and Quincy Railroad. The contractor is required to complete all of the work within 425 days.

This is the second contract to be awarded for the construction of laterals and sublaterals to carry water from the main 28-mile Heart Mountain canal to the farmers' ditches. When the distribution system is completed water will be available for irrigating approximately 41,000 acres of land, of which more than 38,000 acres are public land that will be opened for settlement in accordance with provisions of the Reclamation law.

AGCA Nominates Officers

The executive committee of the Associated General Contractors of America has nominated M. W. Watson, of Topeka, Kansas, to succeed H. B. Zachry, of Laredo, Texas, as president in 1941, according to a recent announcement. D. W. Kimball, president of Owen-Ames-Kimball Company, Grand Rapids, Michigan, was nominated vice president to succeed Mr. Watson.

If elected, the officers will assume their positions at the 22nd annual convention at Houston, Texas, February 17-19, 1941.

Mr. Watson carries on extensive highway, bridge, and building operations in Kansas, Missouri, Nebraska, Colorado and Texas. He is vice president of the A.G.C. for 1940. He has been chairman of the highway contractors' division, member of the advisory board and executive committee, and of the Joint Co-

For your convenience in writing to Gatke Corporation, Inc., you will find a card bound in this issue.

The City of Bloomington, Ind., owns this powerful International TD-18 Diesel TracTracTor shown here handling white loam on that city's airport project. The operator of the TD-18 reports that he likes the clear vision from the driver's seat, and the easy handling and maneuverability.

Keep on the Profit Side with INTERNATIONAL Diesel TracTracTors

In terms of *performance, operating economy, low maintenance,* and *long life,* the FOUR NEW INTERNATIONAL DIESEL TRACTRACTORS are in a class by themselves . . . far ahead of anything you've seen yet in crawler power. The big TD-18 set a new pace when it got on the job last year. The TD-14, TD-9, and the small TD-6 are following right on its heels with their good work.

This quartet of streamlined efficiency has *everything* users have needed and asked for in crawler tractors . . . features and qualities that put TracTracTors well in advance of the market. On-the-job evidence proves the great value of such points as these: Easy-starting, *full* Diesel International engines; wide range of traveling speeds and fast gear shifting; easy-operated, multiple-disk steering clutches; *exclusive* track frame stabilizer and ball-and-socket pivot construction; long-lived, quintuple-sealed track rollers; and accessibility that can't be matched.

Choose the size or sizes of TracTracTors best suited for your work. Pair the power with balanced allied equipment. Then you'll have an outfit that knocks the spots out of anything it goes up against. Ask the nearby International industrial power dealer or Company branch for full information on International Diesel TracTracTors.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago, Illinois

INTERNATIONAL Industrial Power

operative Committee of the American Association of State Highway Officials and the A.G.C.

Mr. Kimball is president of the Owen-Ames-Kimball Company, prominent Midwest building contractors. He is president of the Michigan Chapter of the A.G.C., and a member of the apprentice training and public relations committees.

Marshall Ford Dam in Use

Marshall Ford Dam has begun to rein in the wild Colorado River of Texas, according to reports received from Commissioner John C. Page of the Bureau of Reclamation.

"Diversion conduits have now been sealed off and the dam is beginning to impound water," reports Mr. Page. "This is the start of controlled storage in the Marshall Ford reservoir. When completed, Marshall Ford Dam will provide a substantial measure of flood control on the Colorado, a particularly dangerous stream, subject to quick floods of great heights."

Marshall Ford Dam, under construction by the Bureau of Reclamation is the chief structure of the Colorado River Flood Control Project. It is 12 miles northwest of Austin. It will be the fifth largest concrete dam in the world.

The dam structure will contain 1,864,000 cubic yards of concrete. It will be 270 feet high and 2,623 feet long at the crest. A rock-faced earth embankment 105 feet high and 2,500 feet long will wing off the south end of the dam, making it nearly a mile overall.

Principal purpose of Marshall Ford Dam is to control Colorado River floods which average over $4,000,000 a year in property damage.

Construction of the $24,991,000 dam was begun in March, 1937. At first the dam was to be only 190 feet high but the flood of 1938 demonstrated the need for a higher structure which would more effectively control the river. The dam is scheduled for completion about the end of next year.

In addition to helping control floods and generating hydroelectric energy the dam will regulate the Colorado so as to provide a steady supply of water for irrigation to rice farmers on lands below.

Eden Project Approved

Government officials have approved the Eden irrigation project for construction by the Bureau of Reclamation, according to a recent announcement.

The Eden project is located in southwestern Wyoming near the town of Eden in Sweetwater County. It comprises 20,000 acres and will cost $2,445,000 of which at least $1,200,000 will be repaid in not more than 40 annual installments. The balance of the cost is to be divided between the Works Progress Administration and the Civilian Conservation Corps.

Construction of the project will consist of rehabilitating an irrigation system built 30 years ago under the authority of the Carey Act of 1894. The distribution system will be improved and enlarged, new storage works will be built, and a drainage system will be added.

The Carey Act donated public land to the western states to encourage their settlement and development by means of irrigation construction. Few states took advantage of the grant, many of the irrigation ventures failed for lack of adequate engineering and administration, and the act proved a failure as a whole, leading to participation by the federal government through the reclamation law of 1902, in order to accomplish the desired objective.

Sauerman LONG RANGE MACHINES

A simple SAUERMAN Scraper machine stores and reclaims a seasonal surplus of 30,000 tons of screenings at crushing plant.

Here's another small SAUERMAN Scraper that moves sand from hill to asphalt plant at cost of 4 cents per cubic yard.

This shows a typical SAUERMAN Scraper layout for storing and reclaiming large tonnage of coal, or any bulk material.

Dig, Haul, Dump
in one operation!

For more than 30 years SAUERMAN Cableway Excavators and Power Drag Scrapers have dug, moved, and placed earth, gravel, clay, blasted ore, sand, rock and coal on thousands of different jobs all over the world.

Because of their long reach, SAUERMAN Machines have an advantage over other equipment, for they dig, haul and dump in one continuous straightline operation, eliminating the expense of rehandling.

Increase your profits by taking advantage of the many economies available only with SAUERMAN Machines such as: wide versatility and speed (capacities 10 to 1000 cu. yds. per hour over 100 to 1500 ft. spans), one-man operation, extremely low power and maintenance costs, and reliable, steady operation.

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SAUERMAN BROS., Inc.
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Are ROCK HANDLING PROBLEMS ever Yours?

AN OWEN GRAPPLE will furnish THE SOLUTION

SPECIAL jobs often require special tools and while rock handling problems are doubtless common to many, OWEN has perfected and proved the special tool for this job in the Type RA Rock Grapple. Revolutionary, independent tine action, enormous lifting capacity and other exclusive features distinguish it decidedly from other equipment intended for like use.

Write for the new catalog, just off the press.

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6095 BREAKWATER AVE., CLEVELAND, OHIO
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THE HALF HITCH IS *right*

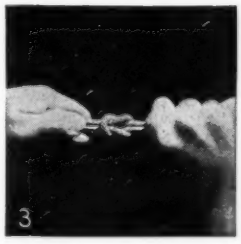
FOR MAIN TO BRANCH LINE CONNECTIONS

These three simple, easy-to-remember rules for Primacord connections promote successful and profitable blasting:

1. Never use a spliced or knotted length of Primacord-Bickford Detonating Fuse in a drill hole!
2. Connect branch lines to the main line with a tight half hitch.
3. See that the branch line leaves the main line at a *right* angle. Avoid kinks and small loops.

The powerful detonating wave of Primacord's PETN core switches over these connections at 3.85 miles per second. That's why it's important to make them RIGHT.

The Primacord Booklet tells the full story of this modern detonating fuse, and suggests ways to better blasting. Send for your free copy today!



PRIMACORD·BICKFORD *Detonating* FUSE

THE ENSIGN-BICKFORD CO., Simsbury, Conn.

Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse since 1836

PB27

1. Tie through cartridge.
2. Half hitch branch to main line.
3. Connect main line lengths with square knot.
4. Fuse and cap on end of main line.

IMPORTANT: Branch lines should lead away from main lines at *right angles.* Avoid kinks and small loops.

For your convenience in writing to The Ensign-Bickford Co., you will find a card bound in this issue.

OBITUARIES

Edward Joseph Harding

Edward Joseph Harding, managing director of the Associated General Contractors of America, died suddenly on October 5, 1940.

Mr. Harding had left his office the day before, and had stopped overnight for a visit with his mother, Mrs. Julia A. Harding of Plainfield, New Jersey, intending to take a boat from New York City for a short vacation cruise to the West Indies. He was accompanied by his wife.

Mr. Harding was one of the most outstanding and widely known men in the construction industry. He had been managing director of the Associated General Contractors since 1930.

After news of his death became known, messages of condolence were received from members of Congress, government officials and executives of construction organizations throughout the country with whom his work had brought him in contact. In addition to his regular duties, Mr. Harding was serving as a member of the Construction Advisory Committee to the Army and Navy Munitions Board assisting in the defense construction program, and was a member of the Federal Advisory Council for Employment Security.

Mr. Harding had been with the Associated General Contractors of America for 21 years. After its formation in 1919 he became field secretary, in 1926 membership manager, and in 1929, assistant general manager. He traveled extensively, and his acquaintance with general contractors and their problems was unequaled.

His first contact with the construction industry was in 1906 in connection with the condemnation of land for the Hudson Tunnels. He worked on the tunnels and the Hudson Terminal Building in New York City. From 1917 to 1921 he was manager for the James Stewart Company, general contractors, of New York City. Some of the construction projects under his management were Camp Pike, Little Rock, Arkansas; Camp Bragg, Fayetteville, North Carolina; Coast Air Station, Long Island; Camp Barges, Baldwinville, New York; naval base and arsenal, Norfolk, Virginia; and two projects at St. Nazaire, Vincennes, France.

Mr. Harding was born in Plainfield, New Jersey, July 13, 1889 the son of Edward J. and Julia A. (Kerwin) Harding. On November 10, 1913 he married the former Marie Ruth McCarty of Plainfield who survives him.

Joseph Ripley

Joseph Ripley, 86, assistant chief engineer in the construction of the Panama Canal and former advisory engineer to the New York State Department of Public Works, died September 28 at his home in Albany, New York, after an illness of two years.

Mr. Ripley, whose engineering career was devoted chiefly to the construction of public projects, mostly in Michigan and New York State, was born in St. Clair, Michigan, January 3, 1854, the son of Volney Abner Ripley and Maria Klein Ripley. In 1876 he received a degree in civil engineering from the University of Michigan and in 1911 the university awarded him a degree of Master of Engineering.

From 1877 to 1906 he served as United States assistant engineer on the improvement of St. Mary's River, in Michigan, and the St. Mary's Falls Ship Canal, Sault Ste. Marie, which included the building of the Weitzel lock, finished in 1881, and the Poe lock, finished in 1896. In 1897 he was United States assistant engineer in charge of a survey and preparation of plans and estimates for a canal 64 miles long, connecting Birmingham, Alabama, with the Black Warrior River. From 1898 to 1906 he was general superintendent of the St. Mary's Falls Ship Canal.

By appointment of President Theodore Roosevelt, Mr. Ripley in 1905 became a member of the consulting board of international engineers for the Panama Canal. He became assistant engineer of the project and later assistant chief engineer. In the latter capacity he was in charge of designing the locks, dams and regulating works.

Mr. Ripley was appointed advisory engineer of the New York State Depart-

(*Continued on Page 664*)

"THIS BUCKET SURELY DIGS"

● Two Williams Buckets are owned by George Slade, General Contractor, Bridgeton, N. J. About the rehandler bucket used to load crushed stone and slag into trucks, he writes, "It is a marvelous rehandling bucket. Two to three dips and the truck is gone."

About his ½ yard digging bucket, he says, "When it comes to excavating ditches, cellars and pipe lines, this bucket surely digs. We don't believe better buckets are built."

Send for free bulletins. They explain the fast, powerful action and rugged strength which make Williams Buckets so profitable to their owners.

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"Built to Last —and Move Dirt Fast"

WILLIAMS *Buckets*
built by WELLMAN

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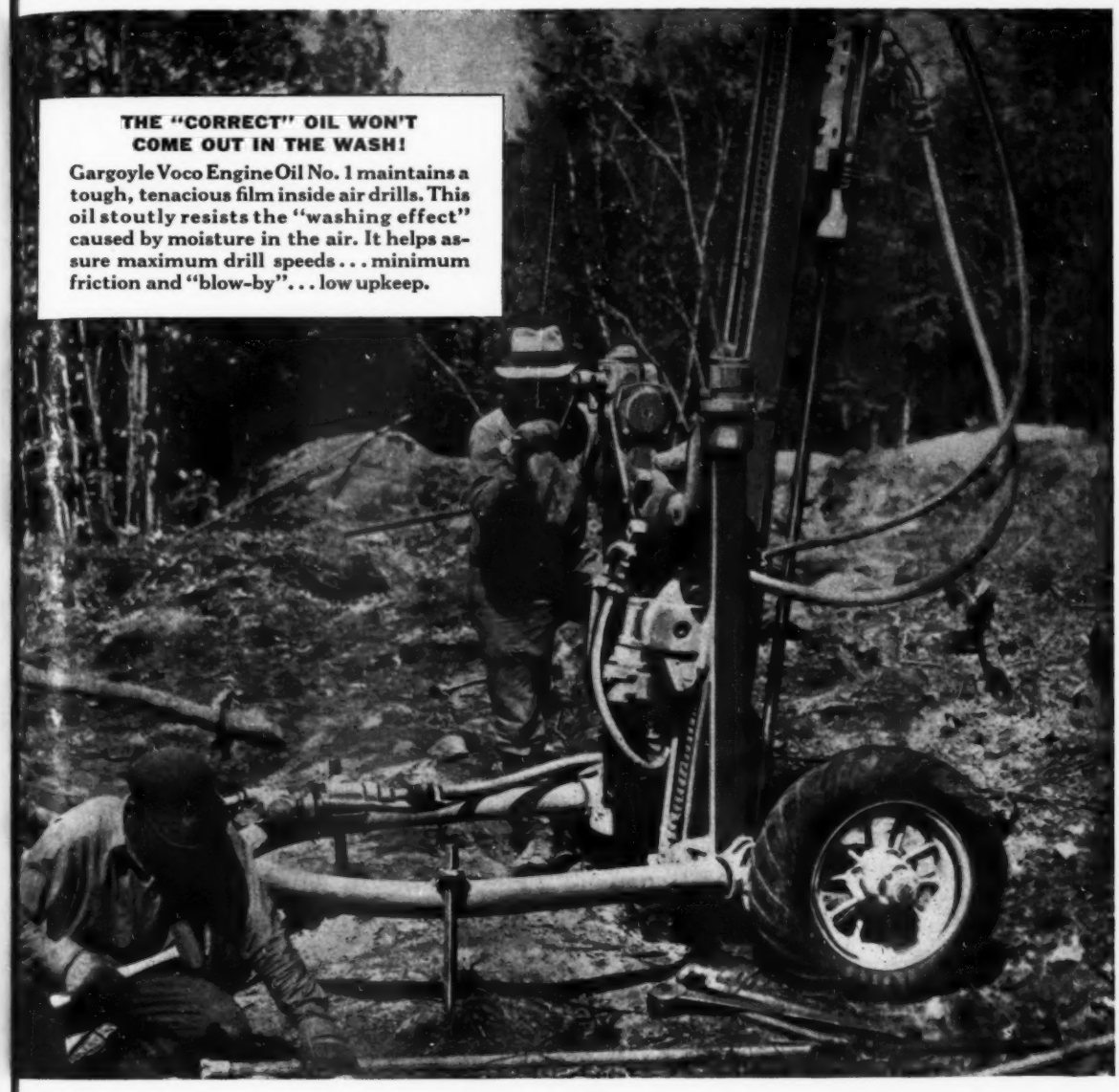
THE "CORRECT" OIL WON'T COME OUT IN THE WASH!
Gargoyle Voco Engine Oil No. 1 maintains a tough, tenacious film inside air drills. This oil stoutly resists the "washing effect" caused by moisture in the air. It helps assure maximum drill speeds . . . minimum friction and "blow-by" . . . low upkeep.

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They're the Buckets to dig with TODAY
Watch a Haiss at work. See how the weight is placed to give GREATEST digging power. That's why a Haiss digs a bigger pay load...Write or wire for prices. All sizes.
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STOP & GO HAULING IS COSTLY, TOO

Why waste time waiting for the truck to pull up, when you can just as well spot several dump buckets on the job for the men to fill, while the Load Lugger is hauling and dumping *continuously!* The Brooks Load Lugger System saves 50% or more on material handling costs, where loading is done by hand. Write for Bulletin and ask about our Special Introductory Offer.

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Obituaries

(Continued from page 660)

ment of Public Works in 1907 by the then Governor Charles Evans Hughes. Two years later Governor Hughes appointed him a member of the advisory board of consulting engineers for the New York State Canals to assist in the construction of the New York State Barge Canal.

He remained a member of the New York State advisory board until 1918, when he accepted an appointment as chief engineer of the Grand Canal Improvement in China. After his return from the Orient, he was active as a private consulting engineer until 1927.

Mr. Ripley married Miss Rebecca McNaughton of Sault Ste. Marie, Michigan, on February 5, 1891. She died in 1907. He married Miss Mary J. Roper, of Edgefield, South Carolina, on June 23, 1909.

Joseph H. Portugal

Joseph H. Portugal, internationally known consulting mining engineer, died on September 10 at Colon, Panama. He was fifty-six years old, a native of Constantinople, now Istanbul, Turkey.

At his death Mr. Portugal was making an exploration trip into the interior of Panama. He returned several months ago after passing two years in China, where he was consulting mining and metallurgical engineer to the Yunnan Province government and assistant general manager of the Yunnan Mining Corporation. He planned a project to modernize mining in Yunnan Province.

In 1928 he became manager of the Empress Minera Colquechaca, in Bolivia, the property of Simon Patino. From 1932 to 1936 he tested and managed various mining properties in Montana, Nevada, California, Oregon, North Carolina and South Carolina. He received his Bachelor of Science degree from the Lycee of Geneva, Switzerland, and completed his engineering studies at the University of Louvain, Belgium.

During the World War he served as captain of ordnance and chemical warfare. He built large power and munitions plants and supervised the construction of the Chemical Warfare School at Lakehurst, New Jersey. He was sent to Italy after the armistice as a member of the American commission to negotiate peace.

From 1921 to 1925 Mr. Portugal was foreign director of the Auto Ordnance Corporation and special representative of the Colt's Patent Fire Arms Manufacturing Company, with headquarters in London and Paris. He also operated gold and diamond placer deposits in British Guiana. He began his career in 1905 with mineral exploration in the Belgian Congo, Africa, and in the Mesopotamian oil fields.

Surviving are his wife, Mrs Catherine A. Portugal, of New York; his mother and four sisters, all living in France.

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

You can't beat Bucyrus-Erie scrapers for speed on the hauls and turns. Long on strength but light in weight, they have a minimum number of parts . . . no dead-weight superstructures and no heavy, complicated, control mechanisms. In order that each pair of fast-rolling roller-bearing wheels will carry its share of weight, the load is kept evenly distributed by maintaining a practically constant wheelbase at all times. With flotation thus balanced, Bucyrus-Erie scrapers roll easily and stay up on top for easy hauling.

They turn safely in narrow limits because of their low center of gravity and because the load does not shift its balance. With the front post of the frame riding directly on the front axle, the center line of the load passes through the center of the axle at all times giving you balanced weight on the front wheels even on turns.

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You'll like the way Bucyrus-Erie scrapers match the speed of your tractor. You'll make money on the time they save you on every haul and every turn.

NOT in the *Contract*

Son: "Pop, I got a lickin' in school today and it's your fault."

Pop: "How's that, son?"

Son: "Remember when I asked you how much a million dollars was? Well, 'helluva lot' isn't the answer."

In the old days parents had to hide their daughter's clothes to keep her at home. That doesn't work now. Today they have to hide her lipstick.

"Shine, please, boy," said the six-foot-five soldier to the shoeblack.

The boy looked down at the vast expanse of boot before him.

"Bert," he called out to another shine boy, "Gimme a 'and—I've got an army contract."

I can't go to the masquerade with Joe.

Why not?

I'm going in my Hawaiian costume and he's going as a harvest hand.

Little Miss Muffet decided to
rough it,
In a cabin quite old and medieval,
A rounder espied her and plied her
with cider
And now she's the forest's prime
evil.

"It's so good of you, doctor, to have come this far to see my husband."

"Not at all, madam, not at all. I have a patient next door, and I thought I'd kill two birds with one stone."

In the days of Queen Elizabeth, 'tis said, some of the ladies of the court liked to curl up with a good book, while others preferred simply to curl up with one of the pages.

"If there be anyone in the congregation who likes sin let him stand up—what's this, Sister Virginia, you like sin?"

"Oh, pardon me, I thought you said gin."

"As amusing a crowd as we ever had, I should say."

Chain Letter

It seems that a most unusual chain letter has been making the rounds recently:

"Dear Friend:

"This chain was started in Reno in the hope of bringing happiness to all tired businessmen. Unlike most chains, this does not cost any money. Simply send a copy of this letter to five male friends, then bundle up your wife and send her to the fellow whose name heads the list. When your name works up to the top, you will, in turn, receive 15,716 gorgeous girls."

HAVE FAITH
DON'T BREAK THE CHAIN

"One man broke the chain and got his wife back!"

According to Republican hecklers, the first new dealer in the world was Christopher Columbus. When he left Spain, he didn't know where he was going, and when he got on the other side of the Atlantic, he didn't know where he was; and when he got back to Spain, he did not know where he had been. AND HE DID IT ALL ON BORROWED MONEY.

Farmer's Wife (to druggist): "Now, be sure and write plain on them bottles which is for the horse and which is for my husband. I don't want nothin' to happen to that horse before the spring plowin'."

"All my success in life," he said proudly, "all my enormous financial prestige, I owe to one thing only . . . Pluck. I want all you young men to take that word for your motto."

He paused impressively, and a small student seated in the front row asked:

"Yes, sir, but won't you please tell us how many and whom did you pluck?"

Alice: What's your father's occupation, Bill?

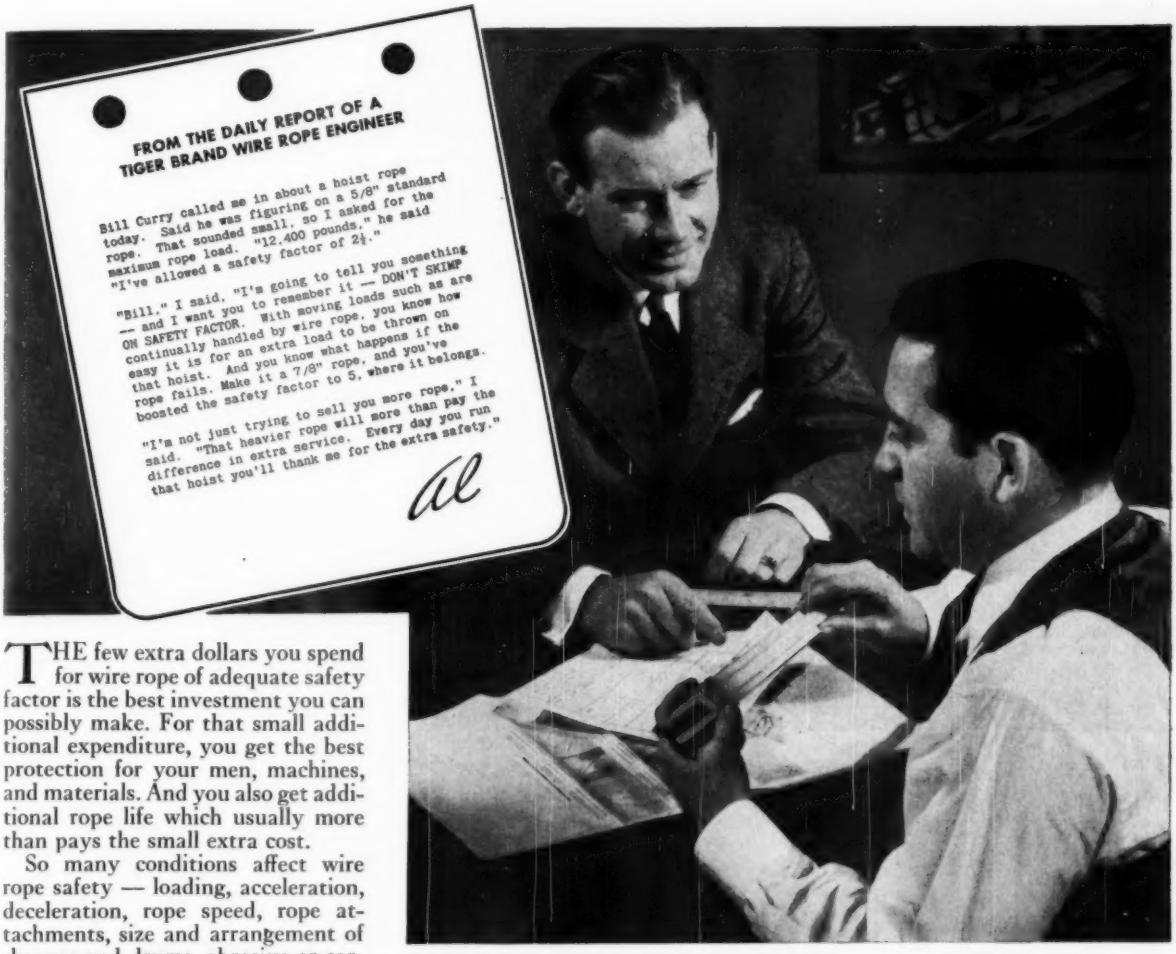
Bill: My father's a cop; but I'm no flop.

Alice: Well, my father's a baker, but I'm no quaker.

Fred: Huh, my father's a chauffeur, but I'm no loafer.

Helen: Er-ah, my father's a surgeon.

DON'T SKIMP ON SAFETY FACTOR


FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER
Bill Curry called me in about a hoist rope today. Said he was figuring on a 5/8" standard rope. That sounded small, so I asked for the maximum rope load. "12,400 pounds," he said "I've allowed a safety factor of 2½."
"Bill," I said, "I'm going to tell you something — and I want you to remember it — DON'T SKIMP ON SAFETY FACTOR. With moving loads such as are continually handled by wire rope, you know how easy it is for an extra load to be thrown on that hoist. And you know what happens if the rope fails. Make it a 7/8" rope, and you've boosted the safety factor to 5, where it belongs.
"I'm not just trying to sell you more rope," I said. "That heavier rope will more than pay the difference in extra service. Every day you run that hoist you'll thank me for the extra safety."
al

THE few extra dollars you spend for wire rope of adequate safety factor is the best investment you can possibly make. For that small additional expenditure, you get the best protection for your men, machines, and materials. And you also get additional rope life which usually more than pays the small extra cost.

So many conditions affect wire rope safety — loading, acceleration, deceleration, rope speed, rope attachments, size and arrangement of sheaves and drums, abrasive or corrosive conditions. Usually one or more of these factors are variable and accordingly, difficult to predict accurately. Therefore, in order to avoid overstressing and subsequent disastrous results, allow adequate safety factors in figuring your wire rope requirements.

In case of doubt about safety factor, ask any American Tiger Brand Wire Rope Engineer. These men bring you, without obligation, all the practical experience gained from thousands of successful installations.

RECOMMENDED MINIMUM SAFETY FACTORS

Track cables	3.2
Guys	3.5
Mine Shafts	
depths to 500 ft.	8.0
depths 500 - 1000 ft.	7.0
depths 1000 - 2000 ft.	6.0
depths 2000 - 3000 ft.	5.0
depths over 3000 ft.	4.0
Miscellaneous hoisting	5.0
Haulage ropes	6.0
Overhead & Gantry cranes	6.0
Jib & Pillar cranes	6.0
Derricks	6.0
Small Electric & Air Hoists	7.0
Hot ladle cranes	8.0
Slings	8.0

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Jungle Gold

(*Continued from page 641*)

tation is costly, it is considerably less expensive and more reliable than river transportation to a place as isolated as La Luz.

The new company, the La Luz Mines, Limited, started construction in November, 1938, and on August 5, 1939, the first unit of the mill was ready to treat approximately 200 tons of dump ore per day. There was no secondary crushing plant ready and consequently the ball mill feed was coarse, consisting of 2-inch material from a primary, 18-inch by 24-inch, Buchanan jaw crusher. At the present writing, a 36-inch by 42-inch jaw crusher, also Buchanan, is in operation as well as a secondary cone crusher, while another secondary is nearing completion. Also, construction is progressing for the installation of another 8-foot by 8-foot Allis-Chalmer ball mill, which will result in a total milling capacity of around 1,200 tons daily. Meanwhile, the open pit is being prepared and drilling, loading, and hauling equipment have been acquired to deliver this tonnage.

When mill operations started on August 5, 1939, there were 91,000 tons of seven-dollar ore available on four dumps and for five subsequent months, all the tonnage delivered to the crushing plant came from this source. Production from the dumps was simple enough, as it only involved slushing with a 4-foot dragline scraper, powered with a double drum Sullivan electric hoist, into a steel chute from which the ore was pulled into 4-ton White dump trucks and hauled to the crushing plant a quarter mile away. As the dumps retreated and the drag distance increased, the ore was churned into mud balls in wet weather, which gave considerable trouble on the screens and in the secondary crusher. To remedy this situation, a ⅜-yard Speeder shovel, mounted on a Caterpillar tractor, was put to loading ore at the foot of the biggest dump, and it proved to be an efficient excavator compared to the dragline scraper, especially during the heavy rains. It would have been quite impossible to keep up production from the dumps without the Speeder shovel in rainy weather, as the principle of the dragline scraper is exactly the opposite to that of the shovel.

The shovel digs into the dump at one face, the material of which keeps coming down from the top and thus mixes the fines with the coarse rocks, whereas the scraper drags on top of the dump, tending to consolidate the fines into mud and coating the rocks with mud as well. Also, the output of the shovel in the hands of an efficient operator is double that of the dragline scraper, while the cost of operation is about equal. As the milling capacity continued to increase, it was difficult to keep up production and therefore another power shovel was acquired, a P&H, ¾-yard machine powered by a 75-HP Waukesha gasoline engine. This was a decided improvement over the trusty Speeder shovel, as it has twice the dipper capacity and is full-revolving, whereas the Speeder, like the steam shovel of long ago, turns

MATERIALS • METHODS • FACILITIES • EXPERIENCE

Some of the men who make Leschen Wire Rope. Average length of service of this group is over 35 years. They are not only skilled wire rope makers, but they train the younger men who are being brought into the organization from time to time.

"Leschen Quality" is the sum of many factors, of which the human element...the Leschen Organization, is an important one. It consists of the men who direct the company's policies, the engineers who design the ropes, and the skilled workmen who either actually make them or supervise each manufacturing process.

You can depend on "HERCULES" (Red-Strand) Wire Rope for safe and economical service, because its entire process of manufacture — from the selection of its material to the last inspection — is planned and double checked. Nothing is left to chance.

Your proving ground for wire rope is on the job, so why not measure the actual worth of "HERCULES" by the yardstick of performance? If there is a saving to be had, do you not want the benefit of it?

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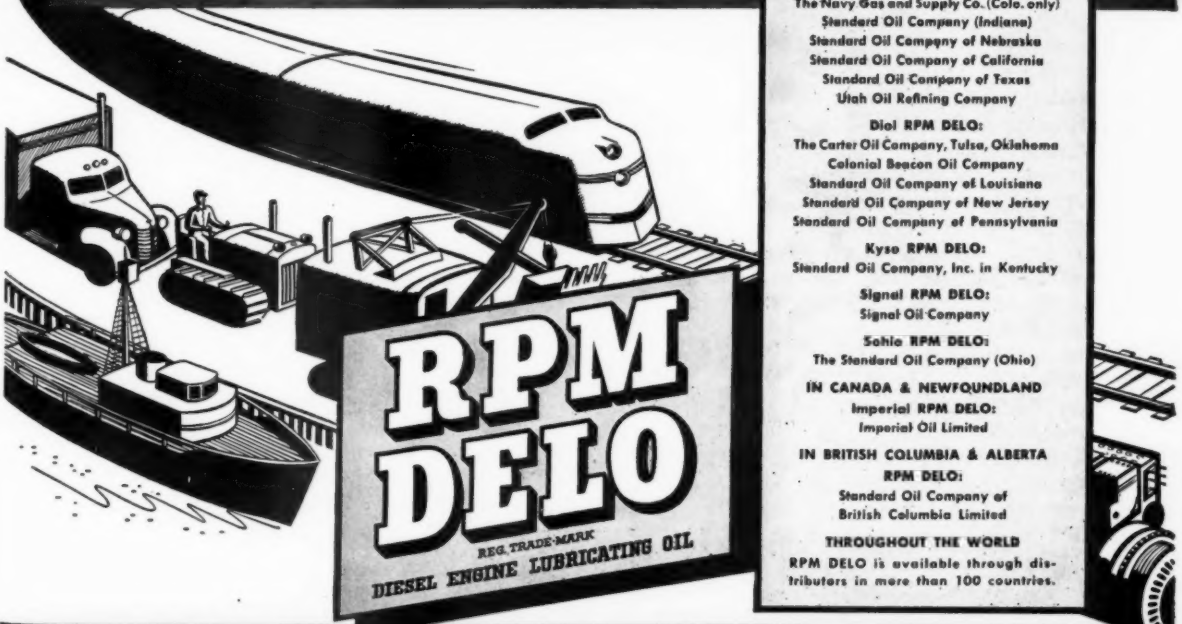

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RPM DELO is available through distributors in more than 100 countries.

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● Recently installed gold ore conveyor at La Lux Mines, Limited (Hancock Photo).

only through an angle of 270 degrees.

With the P&H shovel and the Speeder shovel, the problem of loading ore at the dumps was solved, but as the dumps were being depleted and the pit had to be relied upon for more production, a Bucyrus-Erie 44-B electric shovel was acquired, which henceforth will be used to load out the 2,000,000 tons of ore available by open pit mining. The other power shovels will be used for stripping operations.

Shovel Erecting Problems

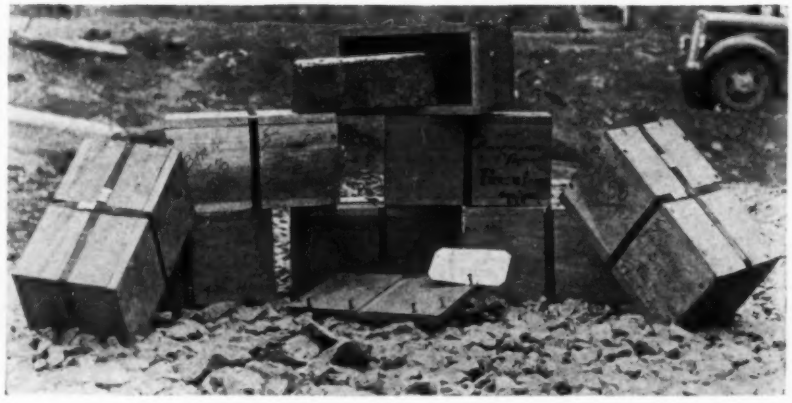
The three power shovels represent a total weight of close to 108 tons, the weight of the 44-B being approximately 67 tons, the P&H 31 tons, and the Speeder 10 tons; and they were all flown in to La Luz from Alamicamba in Ford trimotor airplanes. All arrived disassembled, and the boom, dipper, revolving frame, and truck frame of the 44-B were sectionalized at the factory into pieces weighing a maximum of two tons, the carrying load of the planes. Only the counterweight of the P&H shovel was sectionalized, as the other heavy pieces on this machine weighed less than two tons. The Speeder and P&H were assembled by local mechanics under the direction of the chief engineer, but for the assembling and welding of the 44-B shovel it was necessary to call for two skilled craftsmen from the Bucyrus-Erie factory in South Milwaukee. Presumably, the factory sent the best men available, for they were artists at their jobs. David D. Bain, the erector, arrived first, followed in a week by Geo. L. Vierthaler, the welder. They were skilled and fast workers and completed their task ahead of schedule. In addition, the local welders received much valuable training in helping Vierthaler and the quality of their work subsequently has shown considerable improvement.

At the present writing, the dumps are nearly exhausted insofar as loading with power shovels is concerned, as the lowermost ore must be recovered by hand labor to prevent undue dilution from the underlying dirt, and therefore 95% of the production must come from the open pit. The Bucyrus-Erie 44-B shovel is capable of loading all the ore needed for the mill, which is at present around 600 tons per day, and it does so with efficiency and dispatch. The cycle of operations in the pit includes drilling with an Ingersoll-Rand wagon-mounted heavy drifter with which both vertical and horizontal holes are drilled to a maximum depth of 24 feet.

The holes are spaced from five to eight feet apart in staggered rows and are loaded with Du Pont Gelex No. 2 dynamite, about 20 pounds to a hole. They are blasted in groups of around 100 with instantaneous electric detonators of Du Pont or Hercules manufacture, using series-parallel connections with a maximum of 25 holes to a series. While most of the rock is hard and extremely fissured and full of seams, there are soft strata interspersed between hard layers, which imposes severe strains on drilling equipment and makes it difficult to obtain efficient breakage in primary blasting. Also, on account of the seams and fissures, it is impossible to spring the holes, as the rock fractures to such an extent that a sprung hole is irretrievably lost. After the blast, the 44-B moves in and loads out the ore, while primary drilling continues ahead of the area blasted until the limit of commercial ore has been reached. The south half of the orebody is much wider than the north half and it contains about 315,000 tons of ore above the adit level, which is to be mined out before any work is done in the north end.

The original mining program called for a box cut on the 535 level, in the center of the south orebody, with a bench on each side on which well drill holes were to be drilled; thus widening out from the box cut until reaching the hanging wall and footwall and the ore limit to the south. Along the footwall, however, occurs a high-grade area which it was highly desirable to mine out during the initial stages of operations to provide sufficient income to partly cover the heavy capital expenditures which are contingent with placing new mining enterprises on a paying basis. Therefore, it was decided to recover the ore in the high-grade area, which entails mining out a block near the footwall containing approximately 50,000 tons of ore, the grade of which is considerably higher than the average of the whole orebody,

● A typical shipment of gold at La Lux, ready for transfer to a New York smelting company. These eight bricks were valued at $100,742 (Hancock Photo).



The Education of Contractor Jones

1929

That job I lost sure cost me dough—
How come that Smith could bid so low?

•

(Smart Smith cuts costs on dynamite
With Hercules' new Gelamite.)

1930

Equipment's rusting—idle crew
I'll see what Gelamite can do.

•

(Sure, Gelamite works underground
Pulls rock—and saves on every round.)

1931

Now Jones has learned to figure right,
By specifying Gelamite.

•

(In tunnels, mines from coast to coast
It's in demand—no idle boast.)

1940

Eleven years have passed from sight,
And Jones still banks on Gelamite.

•

(It saves and works—yes, leads the way;
The first—and still the best today.)

E-24

HERCULES POWDER COMPANY

INCORPORATED

972 KING STREET · WILMINGTON · DELAWARE

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and mining will be confined to this area until the high grade ore has been recovered.

Hauling Ore from Pit

The hauling of ore to the mill is done by three 4-ton White dump trucks and a 10-ton Autocar diesel truck, equipped with heavy duty Goodyear tires, which arrived on the mine property simultaneously with the 44-B shovel. The body of the Autocar truck is ten feet wide, and is admirably suited for loading with power shovels, but the White trucks are too small for efficient loading with the 44-B shovel, the dipper of which is nearly the size of the body of the truck. The White trucks are suited for loading with the other power shovels and will be used for hauling dirt from stripping operations after another 10-ton truck has been acquired.

When the Speeder shovel was placed in operation there was considerable difficulty experienced before operators were trained to handle it with care and efficiency. There were no workmen at the mine who had even seen a power shovel before and consequently it was incumbent upon the mine staff to train operators. It was difficult at first, and some breakdowns occurred, but training continued until at present there are extra operators for all three power shovels, most of whom are quite efficient at the controls. A great many prospective operators were tried, and while some were hopeless and others too slow, it was gratifying to find a few who learned quite rapidly to handle the levers.

One tall West Indian, whose ancestors hailed from Timbuktu or Sierra Leone, approached the mine superintendent one day and asked for a job on the Speeder shovel, saying he was anxious to better himself and learn to be a shovel operator. His name was John Cousin, and as he was employed in the crushing plant, he was required to bring a paper from his boss authorizing a transfer to the mining department. The crusher boss was also a West Indian, a colored "gemmen" by name of Guthrie. The next morning Cousin came ready to go to work and duly presented the transfer slip on which it said: "This is to certify—that—Bearer John Cousin was Working at the Crusher, but feel of having a change. he has done nothing. S. M. Guthrie."

Cousin is well over six feet tall, he is black as the ace of spades, and he wears a number fifteen shoe. He seemed quite alert as a pit man, watching every move of the operator and remembering all the motions. Finally, after about two weeks, he thought he had all motions well remembered and asked the operator to let him have a trial. He got up on the seat quite confidently, lowered the dipper into the pile of ore, crowded the stick ahead, hoisted up a full bucket, and started to swing to the truck, which required only a 90 degree turn. Something went awry with his thinking apparatus, and instead of stopping opposite the truck, he continued to swing, forgetting perhaps that the shovel was only ¾-revolving, with the result that he sheared off the exhaust pipes of the engine and bent all the tractor levers before he let go of the controls and dropped the dipper just short of the radiator. How he kept from breaking his long, slender shanks and how he saved his big feet remains a mystery for which he can give no explanation, but he was not even scratched. He did not have any desire to learn to be a shovel runner for about three months after this episode, but he finally learned to run the Speeder shovel and has since become a fair operator.

● Mr. Frank Cameron, general manager in charge of the La Luz Mines, Ltd., operations in Nicaragua.

In concluding this short article on La Luz Mine, it may be interesting to point out that the future of the property is bright. There is no question as to the demand and price of gold, low cost mining on a comparatively large scale is assured by open pit methods, in which efficient excavating machinery is used, and the problem of transportation has been solved by fast, reliable airplanes operated on a business basis.

Also, it may be pointed out that the courage and vision of engineers and men of finance to risk their time and capital on mining ventures of this nature contributes in no small measure to the development of natural resources and the material progress of the western hemisphere.

● The La Luz Speeder shovel works in one of the old dumps with Operator Kennedy at the controls. John Cousin, the pit man who got into difficulty the first time he handled the controls is standing on the crawler treads.

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For Shovels, Draglines, Cranes, Clamshells, Skimmers, and Dragshovels 'Phone or Write the Nearest Dealer or Branch Office Listed Below.

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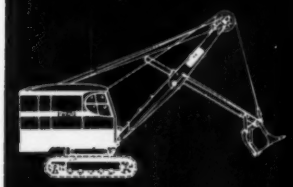
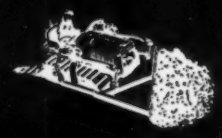
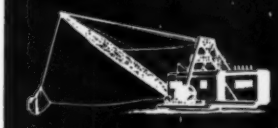
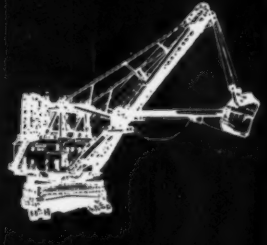
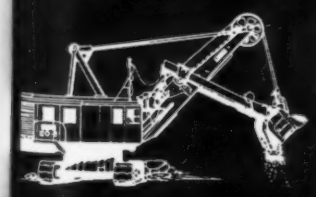
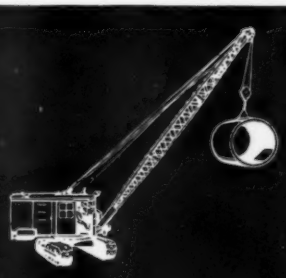
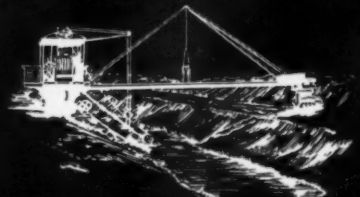





New trade literature

Title: "Building Safety Into Airports—With Efficient Drainage Construction"
Subject: Concise airport drainage data outlined in this new 24-page bulletin.
Where to Get: Armco Drainage Products Association, Middletown, Ohio. Free upon request.

Title: "V-Belt Data Book"
Subject: Belt requirements for water and gasoline pumps, wood-working machines, air compressors, buffing machines, shop equipment and many others are listed alphabetically in this 170 page book. Space is also devoted to numerical listings of belt sizes and dimensions both for V and flat belts along with conversion listings.
Where to Get: B. F. Goodrich Company, Akron, Ohio. Free upon request.

Title: "Commodities In Industry"
Subject: A step-by-step description of the most modern methods whereby each of seventy-five basic raw materials is converted to its finished form. The information contained in this up-to-date reference book was obtained direct from outstanding corporations in each industry. It contains essential information especially for those who produce, process or merchandise, for purchasing executives, students of business and finance and many others.
Where to Get: Commodity Research Bureau, Inc., 82 Beaver Street, New York, New York. Price, $7.50.

Title: "Portable Compressors"
Subject: The manufacturer's complete line of portable compressors of streamlined design is illustrated and described in this new bulletin. Special attention is given their new 500 cu. ft. diesel driven model.
Where to Get: Chicago Pneumatic Tool Company, 6 East 44th Street, New York City, New York. Bulletin 758 is free upon request.

Title: "The Why in Macwhyte Internally Lubricated Wire Rope"
Subject: Two characters, Bill and Bob, discuss the defense against internal friction and corrosion that is built into Macwhyte wire ropes in a 4-page, recently released folder.
Where to Get: Macwhyte Company, Kenosha, Wisconsin. Free upon request.

Title: "Speed Up Moving Of Concrete"
Subject: An 8½x11, two color, profusely illustrated bulletin on Ransome Concrete Machinery Company's line of concrete carts.
Where to Get: Ransome Concrete Machinery Company, Dunellen, New Jersey. Bulletin 163-A is free upon request.

Title: "Pioneer Traveling Grizzly Feeder"
Subject: Description and illustrations on the feeder's many uses.
Where to Get: Pioneer Engineering Works, Inc., 1515 Central Avenue, Minneapolis, Minnesota. Free upon request.

Title: "Slide Rule Calculator"
Subject: A handy device for contractors, engineers and all interested earth-movers to assist in computing probable production for cost estimate and analyses. While prepared primarily for LeTourneau tractor-drawn and Tournapull equipment this calculator is also useful in prophesying the production probabilities of any earth hauling equipment.
Where to Get: All LeTourneau and Caterpillar dealers or by writing Field Engineers, R. G. LeTourneau, Inc., Peoria, Illinois. Free upon request.

Title: "Arc Welding Manual and Operator's Training Course"
Subject: Coverage of practical lessons in arc welding. Used in many leading trade schools, colleges, and technical trade schools as a text.
Where to Get: The Hobart Brothers Company, Hobart Square, Troy, Ohio. Price, $.50 per copy.

COME... SEE HOW IT'S DONE IN '41

CONCRETE INDUSTRIES EXPOSITION
CHICAGO
FEB. 10-11-12

CONCRETE contractors, concrete products and ready-mix men: home builders interested in the fast growing use of concrete and concrete products: general contractors, engineers and public officials: this is *your* show! Plan now to attend!

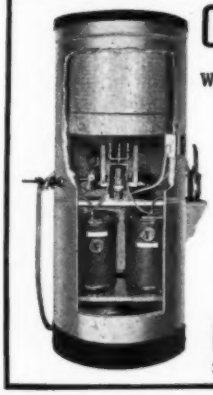
HOTEL SHERMAN
CHICAGO ILL.

HAYWARD BUCKETS

PLAY SAFE... CHOOSE HAYWARDS

Hayward Buckets won't fall down on the job, cause time out, or require costly repairs.

THE HAYWARD COMPANY
52-54 Church Street
New York, N. Y.



Oil Users - Savings Plus
with the new Bucyrus-Erie Oil Reclaimer

1—Filters lubricating oil of any quality or grade from either gasoline or diesel engines.

2—Returns up to 90% of your used crankcase oil ready for re-use.

3—Saves from 60 to 80% on your oil cost.

Write today for complete story.

BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WIS., U. S. A.

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

POSITIONS WANTED

Positions wanted advertisements will be run under this heading for 5 cents per word, minimum charge $1.00. Advertisements for help wanted free of charge.

Address all box numbers c/o EXCAVATING ENGINEER . . . . . at South Milwaukee, Wisconsin

BLAST HOLE DRILL OPERATOR

Blast hole drill operator, 10 years' experience on gas, diesel and electric, large and small machines. Can do own repair work. Middle age, single and willing to go anywhere in U.S.A. Excellent references. Box 9160

EXPERIENCED OPERATOR

Operator with fifteen years' experience on gasoline and diesel powered shovels, draglines, and crane-clamshell machines on highway and sewer construction jobs desires steady work anywhere. Preference: Northwest shovel or dragline about 2 yard capacity. Can do own repair work. References furnished. Age 32. Married. Now located in Missouri. Box 9159

SUPT.-FOREMAN

With 20 years' experience of concrete work on all kinds of buildings, bridges, highway roads. Will go anywhere in United States. Best reference. Box 9165

BLAST HOLE DRILL OPERATOR

Three years' steady employment on Loomis Clipper "44", Cyclone piston type 1200-G and Bucyrus-Armstrong 27-T and 42-T, gas and electric blast hole drills on Penna. anthracite coal field. Able to make repairs. Unmarried. Age 39. Now located in Pennsylvania; willing to go anywhere. Can furnish best of references. Wants steady job on any blast hole drill; preference Armstrong. Box 9161

ALL-AROUND OPERATOR

Can operate any kind of machine, large or small. Can do own repair work. Have had experience in quarry, ore and coal stripping; familiar with grading work. Can operate steam, diesel, gas or electric. Would like steady employment on large-scale operation. Will furnish references. Box 9164

CABLEWAY OPERATOR

Experienced slackline cableway operator wants work operating slackline or dragline. References.

Tom N. Hudson
Route 4, Boone, Iowa

Notes from the manufacturers

H. O. Penn Machinery Company, of New York, Mineola and Poughkeepsie has adopted a pension plan similar to and supplementary to the Social Security Act which provides federal pensions for industrial employees retiring after 1941. The plan provides for the payment to the employee, upon reaching the age of 65, the equivalent of four years' salary which is applied to the purchase of monthly income for the life of the employee—in most cases equal to about 40% of the salaries now enjoyed. Employees also receive approximately one full year's salary in cash at the age of 65 for emergency purposes. Upon the death of an employee, his widow receives about 70% of four year's salary as a minimum amount.

Young Radiator Company, Racine, Wisconsin, recently announced two changes concerning new members of its organization. A. D. Lynch, formerly personnel director of J. I. Case Company, Racine assumes the same duties with Young. Boyce W. Knight, who since early in the year has been doing special survey work for the Young Radiator Company, has been appointed their representative in the middle western territory to serve the tractor, truck and industrial radiator division.

Cleveland Tractor Company now has an additional representative on the west coast in the person of H. P. Mee, executive vice-president of that company who, because of extensive business interests there, will make his headquarters in Santa Barbara, California. He will continue to be closely affiliated with the Cleveland Tractor Company as a director, and will also be in charge of the company's interests in the seven western states comprising their western division.

The Whiting Corporation, Harvey, Illinois, announces the acquisition of the Quickwork Company, formerly of St. Marys, Ohio and Chicago, Illinois, manufacturers of rotary shears, stamping trimmers and forming machines, power hammers, throatless shears and flangers. The entire Quickwork line will be manufactured by the 56-year old Whiting organization in their 20-acre plant at Harvey. Stevens H. Hammond, vice-president of the Whiting Corporation, will be in charge of all Quickwork operations. Paul V. Hyland, formerly of the industrial division of Whiting, has been appointed Quickwork sales manager. B. W. Packer, formerly with the Quickwork Company, joins the new organization as chief engineer.

John A. Roebling's Sons Company, Trenton, New Jersey, announce the appointment of Roger H. Clapp as assistant general manager of sales, with headquarters in Trenton. He came to the Roebling Company in 1936 and was appointed manager of the Philadelphia branch where he remained until the present change occurred.

Chain Belt Company's eastern district manager of their construction equipment division, Morrison Mills, died suddenly September 25 in Philadelphia, Pennsylvania, where he made his home. Mr. Mills was service manager of the construction equipment division of the company from 1931 to 1937 and eastern district manager since that time. He was born in Calumet, Michigan 37 years ago and was a graduate of Harvard University in the class of 1925.

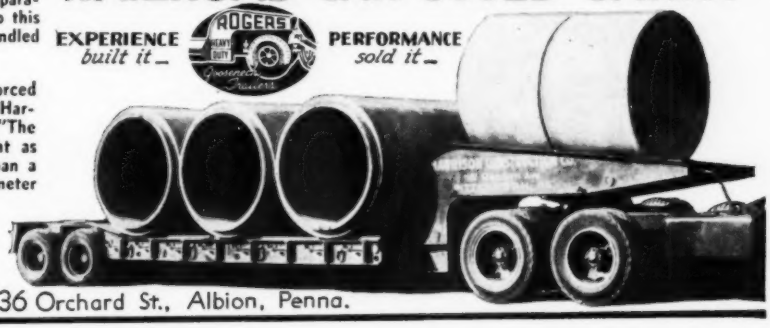
"*Our* ROGERS TRAILER *with* A BIGGER LOAD THAN A RAILROAD CAR COULD CARRY"

TO limit the usefulness of Rogers Trailers to HEAVY loads is a mistake. Bulky but comparatively light loads are often particularly fitted to this type of vehicle. Dimensions of parts to be handled are also a factor.

For example, consider the eight 60" reinforced concrete pipes, a total of only 20 tons. The Harrison Construction Co. of Pittsburgh, Pa. wrote, "The oddity of this load is not so much the weight as the bulk. This trailer carried a bigger load than a railroad car can haul, due to the extreme diameter of the pipe."

Write for information on Rogers complete line.

EXPERIENCE *built it*— PERFORMANCE *sold it*—



ROGERS BROS. CORP. 136 Orchard St., Albion, Penna.

For your convenience in writing to Rogers Brothers Corporation, you will find a card bound in this issue.

Carboloy Company, Inc., W. G. Robbins, president, has appointed W. C. Weslow manager of their mining division. He came to Carboloy Company in 1931 and for the past nine years he has been field and development engineer in connection with diamond impregnated tools.

The Harnischfeger Corporation of Milwaukee announces the appointment of the Shaw-Newlin Company, Highway No. 65, South, Chillicothe, Missouri, as exclusive agents for models 100, 150 and 255 in the P&H excavator line. Shaw-Newlin will operate under the supervision of the Harnischfeger Kansas City Office.

Timken Roller Bearing Company, Canton, Ohio, has appointed George W. Curtis as their Milwaukee division manager. Industrial and automotive bearing sales as well as alloy steel activities of this division will be under his supervision. Since his graduation from the Carnegie Institute of Technology in 1920 he has served in engineering and sales capacities at Canton, Ohio, and Pittsburgh, Pennsylvania. In 1930 he was transferred from Pittsburgh to Milwaukee where, before the recent appointment, he served as district manager of the industrial division.

John A. Roebling's Sons Company, Trenton, New Jersey, recently appointed E. N. Graf, former manager of their Pittsburgh branch, as assistant manager of sales, wire rope division, with headquarters at Trenton. His first association with the Roebling Co. came indirectly in 1919 when he took over specialized wire rope sales for a Roebling distributor in Pittsburgh. In 1938 Roebling opened a branch office in Pittsburgh and he was put in charge of wire rope sales and in 1939 became manager of the branch, where he remained until his recent promotion.

FOR SALE

RATES: 60c per line—minimum charge $2.40. Repeat insertions with no change in copy—three insertions for the price of two. ¶ Display advertising in this section at published display advertising rates. ¶ Estimate 41 characters per line, counting all spaces and punctuation as one character each. Allow ten characters for box number for blind advertisements. If address given, counts same as advertising copy. ¶ Rates are net (no commission, no discount) and payable in advance of publication. Send your remittance with insertion order and copy. ¶ Closing date—15th of preceding month. Example—January issue closes December 15.

Address all box numbers c/o EXCAVATING ENGINEER . . . . . at South Milwaukee, Wisconsin

SMALL SHOVELS, CRANES AND DRAGLINES
Up to 2½ Cubic Yards

BUCYRUS-ERIE 42-B 1½-yd. Steam Shovel. Good operating condition. Located Maryland. Box 2634

BUCYRUS-ERIE 10-B Gas Dragline. First class condition. Located California. Box 2599

TWO BUCYRUS-ERIE ELECTRIC TUNNEL SHOVELS. Model 33-B—17' Booms—14' 1½" Dipper Handles—1½ cu. yd. cast Rock Dippers. 60 H.P., 2 phase, 60 cycle, 440 volt motors. Only used one short job. Located Western Pennsylvania. Box 2608

LINK-BELT MODEL K-44. 60' boom Clamshell and Dragline. Gas power. Located Missouri. Box 2616

BUCYRUS-ERIE GA-2 High Lift 1 yd. Shovel and 45' Boom Crane. Waukesha WS engine. Single Shaft Cats. Operating condition. Located eastern Pennsylvania. Box 2566

BUCYRUS-ERIE 37-B Gas Dragline. 2-cu. yd. bucket. Kohler 1½ KW Light Plant. 2 flood lights. 40' boom. Long and wide cats. Wisconsin 6 cylinder engine. Good operating condition. Located Mississippi. Box 2601

LINK-BELT MODEL K-48 Gas Shovel. 1¾-yd. Esco dipper. Good operating condition. Located Montana. Box 2618

BUCYRUS-ERIE GA-2 Gas-Air high lift shovel. 24' boom. 18'4" dipper handle. 1¼ yd. dipper. Waukesha 6½"x8" 4-cylinder engine. Electric starter. Quantity spare parts included. Excellent condition. Located Eastern Pennsylvania. Box 2559

KOEHRING MODEL 1-A. Combination 40' boom crane and dragline. Gasoline. Wisconsin engine. Operating condition. Located near St. Louis. Box 2402

NORTHWEST MODEL 6 50' boom Gas Crane. Long cats. 4-cylinder Twin City engine. Excellent condition. Located New York City. Box 2615

KEYSTONE MODEL 4 — Gasoline dragshovel. Operating condition. Located western Pennsylvania. Box 2526

NORTHWEST 6—1½ yd. Shovel. Twin City Oil Engine. Operating condition. Located California. Box 2482

BUCYRUS-ERIE 50-B Electric Shovel. 30' boom, 17' dipper handle, 2-cu. yd. dipper. 3 motor suitable for power supply 3 phase 25 cycle 440 volt. Excellent condition. Located Southern Wisconsin. Box 2638

FOR SALE. Account owner retiring from business. Bucyrus-Erie 10-B Gas Shovel. Electric starter. Good mechanical condition. Owner will sacrifice. Box 2641

INDUSTRIAL-BROWNHOIST. 40' boom Clamshell including 1¼-yd. Owen bucket. Buda Gas engine. Located Central Illinois. Box 2633

LORAIN MODEL 55, 1-yd. Diesel Shovel. Caterpillar D-8800 4 cylinder engine. Excellent condition. Located Virginia. Box 2597

BUCYRUS-ERIE 50-B Steam Coal Loader. 2-yd. dipper with sides built up to 2¼-yd. Turbine Light Plant. A-1 condition. Quantity spares included. Ready to operate. Located Indiana. Box 2620

KOEHRING Model 701 1¾-yd. Diesel Shovel. Caterpillar Diesel D-13,000 engine. Overhauled since last job. Excellent condition. Located Kentucky. Box 2637

If You Do Not Find What You Want Listed — Write Us
EXCAVATING engineer
South Milwaukee, Wis.

BUCYRUS-ERIE Model E-2 diesel crane and dragline, shop No. 10984, equipped with 50 ft. boom, Kohler Light Plant and Atlas diesel engine. Located Eastern Oklahoma. Bargain. Box 2611

BUCYRUS-ERIE 50-B Steam Shovel. 27' boom, 18' dipper handle, 1½-yd. dipper. Now operating. Located Kansas City, Missouri. Box 2636

BYERS MODEL 128 ⅝-yard Gas Shovel. 35' Clamshell Boom and ½-yard Erie Clamshell Bucket and Back Hoe. Hercules Engine. Good operating condition. Reasonably priced. Located near Pittsburgh, Pa. Box 2495

LORAIN MODEL 60, 1-yd. Gas Shovel. Electric Starter. Waukesha Engine. Good operating condition. Located Minnesota. Box 2594

BUCYRUS-ERIE Type B High Lift ¾-yard steam shovel. Operating condition. Located vicinity Boston. Box 2401

NORTHWEST MODEL 6 Dragline, 60' Boom. 1½-yd. Page Drag Bucket. 1500W Kohler Light Plant, Wisconsin—D-S-4—6 cylinder 5¾"x6" engine. Good operating condition. Located Indiana. Box 2596

BUCYRUS-ERIE 10-B Gas Dragline and ⅜-yd. Page RM bucket. Good operating condition. Located Colorado. Box 2635

LORAIN ¾-yard Combination Gas Shovel and 40' boom dragline including drag bucket. Waukesha engine. Good operating condition. Located Oregon. Box 2632

BUCYRUS-ERIE 30-B Diesel 50' boom Dragline. 1¼ yd. Page drag bucket. Good operating condition. Located Illinois. Box 2540

BUCYRUS-ERIE 43-B Gas Shovel. 23' boom, 17' dipper handle, 1½-yd. dipper. Chain crowd. Electric starter. Wisconsin 6-cylinder 6"x7" Model E engine. Extensively repaired. Excellent shape. Located vicinity Boston. Box 2556

BUCYRUS-ERIE 41-B 1¼-yd. Steam Shovel. Cat mounted. Reasonably priced. Located Vermont. Box 2614

BUCYRUS-ERIE 45-B Diesel Dragline. 70' boom. Bargain price. Located Florida. Box 2619

BUCYRUS-ERIE HIGH LIFT 55-B Diesel Shovel. 25' boom, 22' dipper handle. 2-yd. dipper. Kohler light plant. Atlas 6-cylinder 6½" x 8½" engine. Good operating condition. Located Central New York state. Box 2627

NORTHWEST MODEL 85 Dragline. 80' Boom. 2-yd. Basket Type Drag Bucket. Light Plant. Twin City Oil Engine, 4 cylinder 8"x9". Only used 21 months. Located Louisiana. Box 2593

INSLEY Model R ½-yd. Gas Dragshovel. Electric Starter. Good Operating Condition. Located Oregon. Box 2644

LARGE SHOVELS, CRANES AND DRAGLINES
2½ Cubic Yards and Over

Marion Model 70 Steam Shovel
Marion Model 91 Steam Shovel
Marion Model 76 Steam Shovel
All the above in operating condition and located in Pennsylvania. Box 2598

MARION No. 125 Steam Shovel. 2¾-yard, 55 ft. boom, 36 ft. sticks. On cats. Light plant. Now working Central Missouri. Good condition. Priced to sell. Box 2586

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